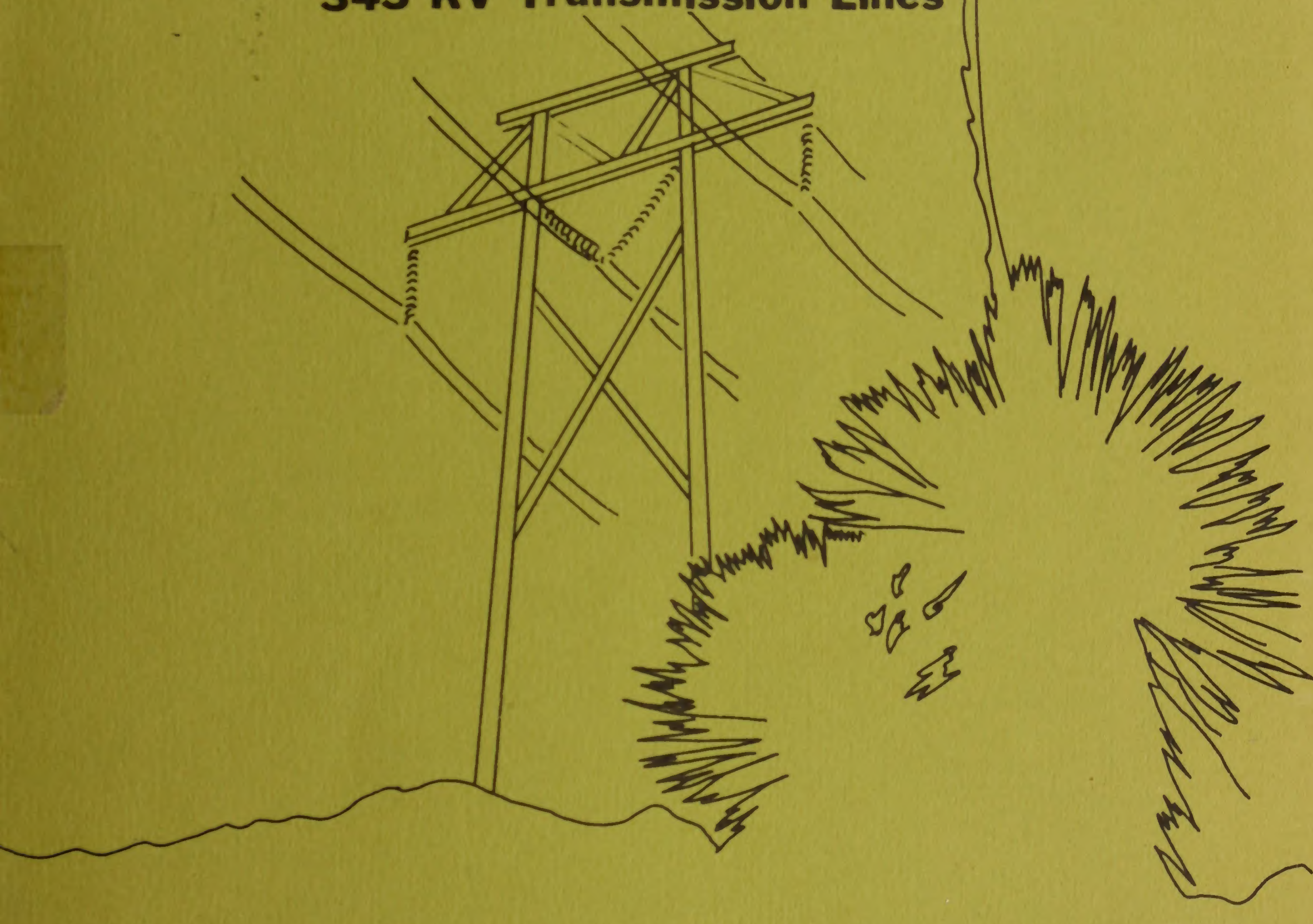
FINAL ENVIRONMENTAL STATEMENT

Greenlee County, Arizona To El Paso, Texas 345 KV Transmission Lines



UNITED STATES DEPARTMENT OF THE INTERIOR

Bureau of Land Management

FINAL
ENVIRONMENTAL STATEMENT
PROPOSED
345 KV TRANSMISSION LINES
GREENLEE COUNTY, ARIZONA
TO
EL PASO, TEXAS

Prepared by
Bureau of Land Management
July 1976

Curt Berklund
Director

SUMMARY

Draft ( ) Final (X) Environmental Statement

Department of the Interior, Bureau of Land Management, New Mexico State Office.

1. Type of Action (x) Administrative ( ) Legislative

2. Brief Description of Action

The Department of the Interior proposes to grant rights-of-way to Public Service Company of New Mexico (PNM) and El Paso Electric Company (EPE) to construct two 345 KV transmission lines, running parallel on a single right-of-way for about four-fifths of the distance, from Tucson Gas and Electric Company's (TG&E) Greenlee County, Arizona substation to El Paso, Texas. The proposed lines will be an extension of the transmission line network from San Juan (Four Corners) generating complex and will be completed in two phases. PNM will first construct two 345 KV lines eastward from TG&E's Greenlee County substation, one ending at Lordsburg, New Mexico and the second at Deming, New Mexico. In the second phase, EPE will extend both lines into El Paso, Texas.

3. Summary of Environmental Impact

The proposed routes will establish new high voltage transmission line corridors passing through desert areas of open space and scenic value which now have little or no above ground intrusion. Construction activities along certain segments of the proposed routes could potentially damage or destroy archaeological sites. New access roads would be constructed in several segments located in New Mexico and Arizona.

4. Alternatives Considered

A. Alternate routes.
B. No transmission line.
C. Use or upgrade existing transmission lines.
D. Undergrounding.
E. Double circuit towers.
F. Direct Current.
G. Other power sources.

5. Comments have been requested from: (See summary attachment)

6. Date statement made available to CEQ and the public:

Draft statement: February 18, 1976

Final statement:

SUMMARY ATTACHMENT

Comments have been requested from the following: Comments were received from those agencies indicated by an asterisk.

Federal Agencies

- Department of Interior
  - Bureau of Outdoor Recreation*
  - Bureau of Reclamation*
  - Fish and Wildlife Service*
  - Geological Survey*
  - National Park Service*
  - Bureau of Mines*
- Department of Agriculture
  - Forest Service*
  - Soil Conservation Service*
- Advisory Council on Historic Preservation*
- Department of Health, Education, and Welfare*
- Department of Transportation*
- Department of Housing and Urban Development*
- Environmental Protection Agency*
- Energy Research and Development Administration*
- Federal Power Commission
- Commanding General, Ft. Bliss, Texas*
- Corps of Engineers*

State Agencies

- New Mexico
  - Office of the Governor
  - State Department of Game and Fish*
  - State Highway Department
  - Environmental Improvement Agency*
  - Public Service Commission
  - State Planning Office*
  - State Land Office*
  - Museum of New Mexico
  - Southwestern Council of Governments*
- Arizona
  - Office of the Governor
  - Game and Fish Department*
  - Highway Department*
  - Land Department
  - Parks and Recreation*
  - Siting Committee
  - State Clearinghouse*
  - State Museum
- Texas
  - Office of Governor
  - West Texas Council of Governments*

Private and Local

- City of El Paso*
- El Paso Natural Gas*
- Arizona Wildlife Federation*
- Southern Pacific Pipe Lines Co.*
- Southern Pacific Transportation Co.*

The distribution list for the draft statement is in Chapter IX.

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I. DESCRIPTION OF PROPOSED ACTION

A. Background and Purpose

Public Service Company of New Mexico and the El Paso Electric Company propose to construct two 345 KV transmission lines from Tucson Gas and Electric Company's Greenlee Switching Station in Greenlee County, Arizona across southwestern New Mexico to El Paso, Texas. This will require the granting of rights-of-way by the BLM for this construction. The completed lines will total approximately 250 miles from southeastern Arizona to two substations in El Paso, Texas. The project will require a single right-of-way approximately 300 feet in width for approximately 158 miles from the western end. This will divide into two separate rights-of-way, each approximately 150 feet wide, at the El Paso end. The two narrower rights-of-way will each approximate 46 miles in length. Construction is proposed in two distinct phases as described below.

PHASE ONE

Public Service Company of New Mexico (PNM) proposes to construct two 345 KV transmission lines and related facilities to be called the Southwest New Mexico Transmission (SWNMT) Project. The first transmission line will originate at the Tucson Gas and Electric Company's Greenlee Switching Station near the Greenlee County Airport in southeastern Arizona and will terminate near Lordsburg, New Mexico at a proposed switching station known as Hidalgo. The planned in-service date for this line is 1977. The second transmission line will also originate at the Greenlee Switching Station and will parallel the first line within the same right-of-way to the Hidalgo site, continuing then

to its termination near Deming, New Mexico at a proposed switching station known as Luna. The planned in-service date for the second line is 1978.

The SWNMT Project is primarily intended to transmit 100 MW of power for Community Public Service and 30 MW of power for Public Service Company of New Mexico from the Greenlee Switching Station to the Hidalgo Switching Station.

PNM will need this power to better serve the projected load increase in the Silver City District, and serve the Columbus Co-op with bulk power to enable that company to meet the increased load demand of its customers in southwestern New Mexico. Also proposed is transmittal of 70 MW of power from the Greenlee Switching Station to the Luna Switching Station to enable PNM to meet the projected load increases of its Deming Division customers. These quantities are the predicted commitments by 1978.

The power need forecasts were brought up to date in late 1974 (Table 1). As this table shows, the total southwestern New Mexico peak load in 1976 is expected to reach 107 MW. That load forecast applies mainly to the New Mexico counties of Hidalgo, Grant, and Luna. This area's need can be satisfied only by bringing in electrical transmission from generating sources outside the immediate area. Because of natural gas curtailments in the area, output of the Lordsburg generating plant is normally limited to 31 MW. Therefore, the balance of the 107 MW need in 1976 must be transmitted into the area over high voltage transmission lines. Prior

TABLE 1

SOUTHWESTERN NEW MEXICO PEAK LOAD FORECAST[1]

Utility	Megawatt Load									
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Columbus Co-op	34.0	34.9	35.8	36.8	37.8	38.9	40.1	41.3	42.6	43.9
Community Public Service Silver City District	53.6	56.5	71.6	131.8	139.1	146.6	154.2	156.8	159.9	162.9
Public Service Company of New Mexico Deming Division	15.0	15.9	16.8	17.7	18.7	19.8	20.9	22.1	23.4	24.7
Total Southwestern New Mexico Loads	102.6	107.3	124.2	186.3	195.6	205.3	215.2	220.3	225.9	231.5

1. Data from Public Service Company of New Mexico, December 4, 1974.

to the proposed Greenlee to Hidalgo 345 KV transmission line, the "dependable" or "firm" transmission into the area is 43 MW. The 74 MW now available from the dependable transmission of 43 MW added to the 31 MW of local generation that can be counted upon fall short of the 107 MW need for 1976.

In 1978, southwestern New Mexico's power need is predicted at 186 MW. In order to increase the firm resources--that is, the dependable power available--in this area, the second 345 KV transmission line is proposed. The second line would add two features to the transmission system:

1. Establishment of a new delivery point to the Deming load center of PNM and Columbus Co-op.

2. A material increase in the firmness or dependability of the transmission system by virtue of its independence from the first line.

Transmission lines constructed during the first phase of the proposal will be designed with sufficient current carrying capability to allow 800 MW of power to be transmitted over the system. This will enable El Paso Electric Company (EPE) to proceed with the second phase of the proposed project.

PHASE TWO

El Paso Electric Company of El Paso, Texas proposes to interconnect the transmission lines constructed in the SWNMT Project with its substations in El Paso. To do so, two mostly parallel 345

KV transmission lines are planned. The first, to be constructed in the 1978-79 time frame, would connect Luna Substation near Deming, New Mexico with EPE's Newman Substation northeast of El Paso. The second line is planned for 1981-82 and would connect the Hidalgo Substation near Lordsburg, New Mexico with EPE's Rio Grande Substation west of El Paso (Figure 6).

The construction planned by EPE is intended to provide electrical transmission paths from Arizona and/or New Mexico generating stations into the El Paso area. The proposed lines would enable El Paso Electric to meet its load responsibility by contracting with utilities in New Mexico and Arizona possessing the needed capacity. Table 2 presents the EPE forecast of loads and generation resources for the next 10 years. The increases in resources forecast from 1979 through 1984 can be met only by contracting with New Mexico and Arizona utilities, since natural gas and fuel oil--the only fuels available in the El Paso area-- are becoming increasingly scarce. Both PNM and El Paso Electric are participants in the Palo Verde Nuclear Generating Station project. The proposed transmission lines will be used for transmission of power from this plant.

In addition to meeting projected power demands, the proposed lines would improve reliability and continuity of service to the southwestern New Mexico - El Paso, Texas area. The lines as proposed will complete a 345 KV loop from Four Corners - San Juan

TABLE 2

EPE LOADS - RESOURCE FORECAST (MW)

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
Projected System Peak Loads	676	720	777	813	878	946	938	1005	1077	1154
Projected System Resources	913	903	973	983	1018	1068	1226	1248	1396	1596

TABLE 3

Projected Maximum Power Flows (MW)
Greenlee Substation toward El Paso
Recipient

Year	CPS-PNM	EPE	Total
1979	165	112	277
1980	174	112	286
1981	184	312	496
1982	189	312	501
1983	195	512	707
1984	201	512	713

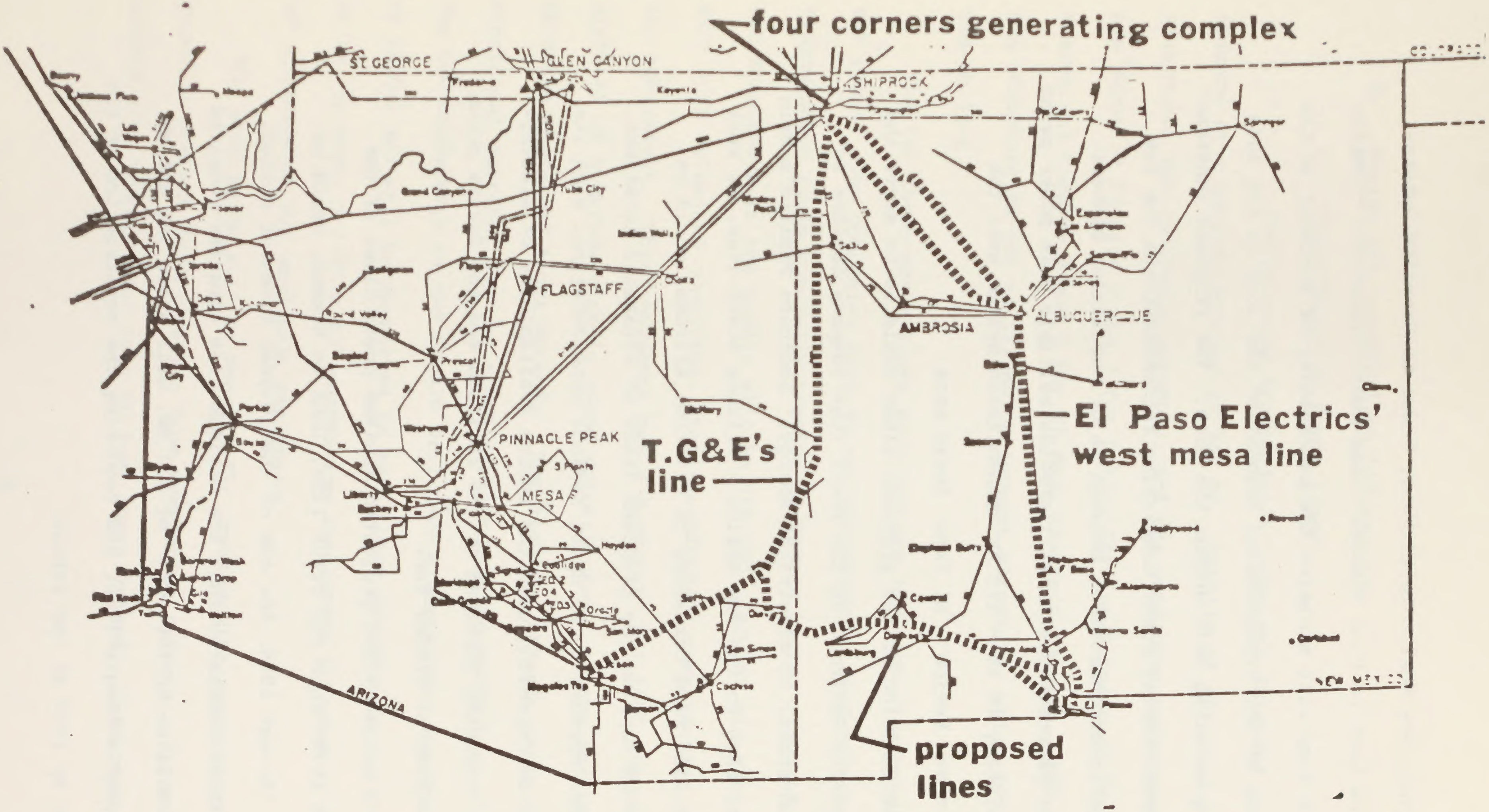


figure 1 Proposed Interconnected Transmission System

From Final Environmental Impact Statement, San Juan Generating Station, Coal Mine, and Transmission Lines. Bureau of Reclamation, 1973.

to Albuquerque, New Mexico to El Paso, Texas to Greenlee Substation, Arizona back to Four Corners - San Juan (Figure 1). Completion of this loop will minimize the possibility of blackout in the event of loss of any transmission segment of the loop or the loss of a major generating unit around the loop. The proposed construction will meet Federal Power Commission recommendations for the high voltage interconnections between major population centers. Further, the proposed system will provide multiple bulk power paths into the existing 69 KV - 115 KV transmission system over the southwestern New Mexico - El Paso, Texas area.

Another function of the proposed lines could be to serve the Southern Pacific Railroad in the event that company decides to convert from diesel to electrical energy. Southern Pacific's main line from El Paso to the New Mexico - Arizona state line, as well as its spur line from Lordsburg to Clifton, Arizona, could be electrified by tapping the proposed lines at strategic locations. This proposal appears to be under serious consideration, with its implementation depending upon the future availability of electricity along remaining portions of the railroad and the future price and availability of diesel fuel.

Table 3 presents the projected maximum power flows of the system from 1979, when the first line, Luna to Newman, would be completed, through 1984, the end of the 10-year forecast period. This tabulation indicates that the maximum line capacity required by 1981-82 will be on the order of 500 MW, well above the 400 MW base rating of a single line, and requiring the construction of the second line by 1982 at the latest.

B. Design and Construction Information

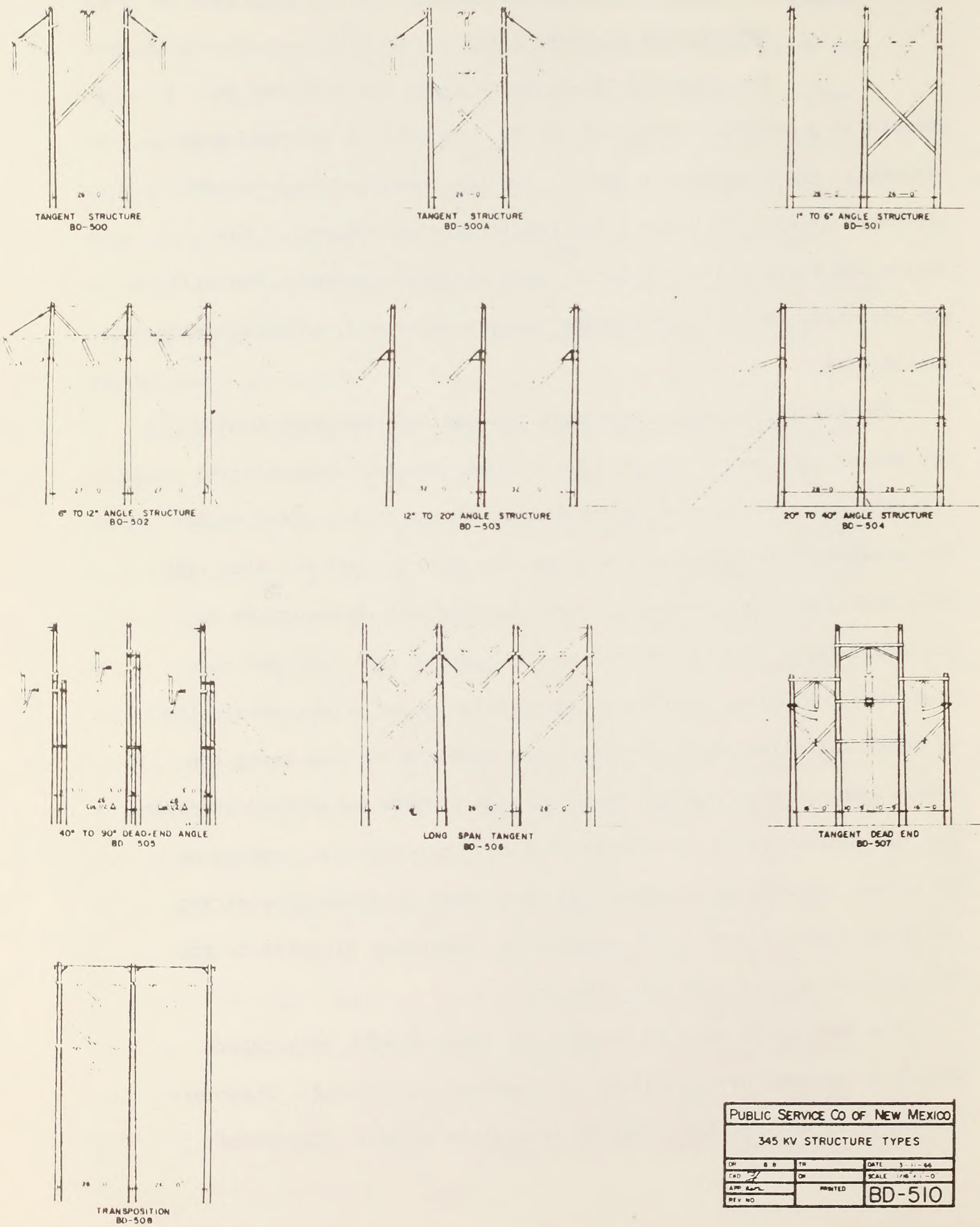
1. Description of Power Lines

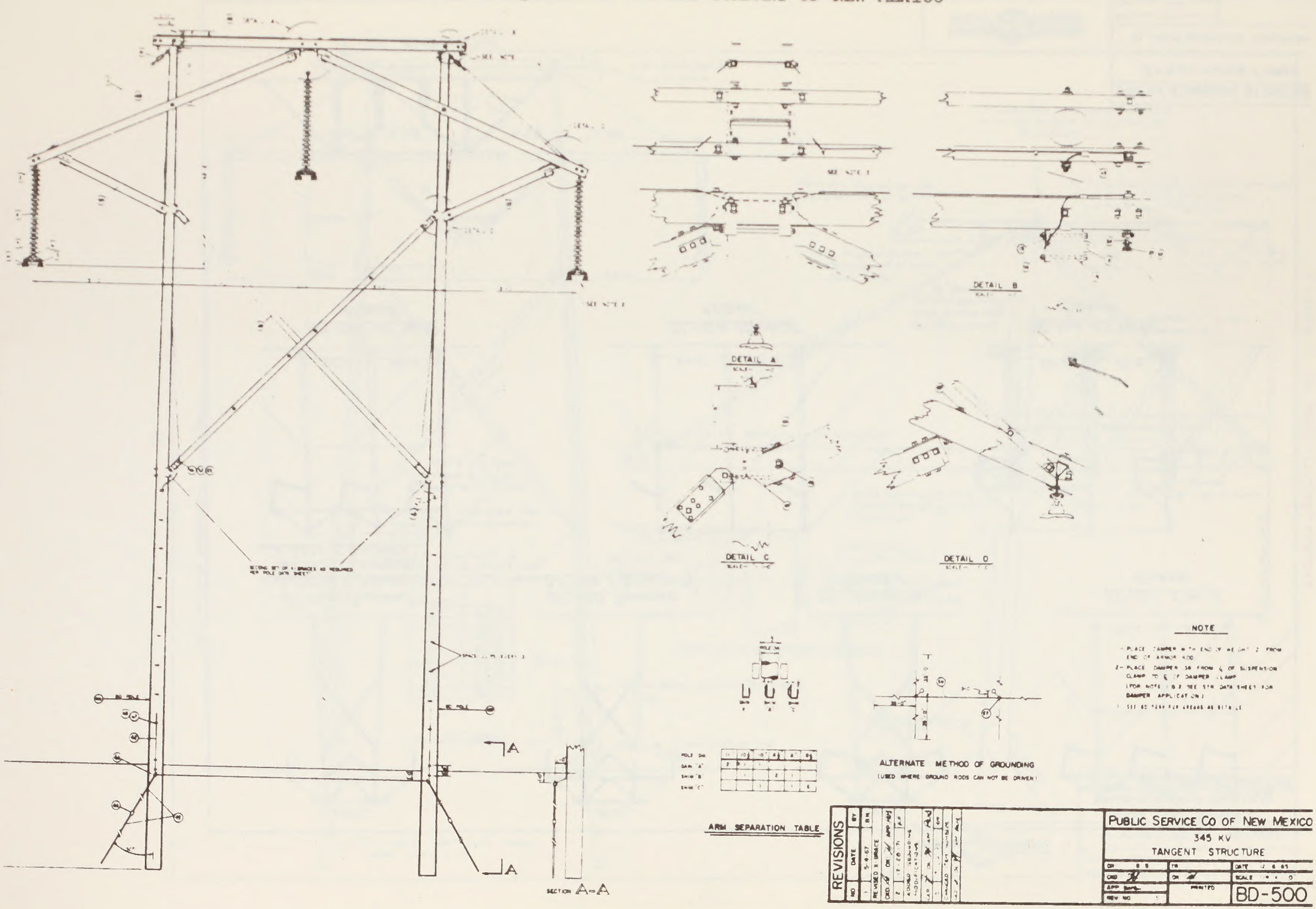
The proposed transmission lines are intended to operate at a nominal voltage of 345 KV. Details of the wood pole structure, the insulator assembly, and the conductor arrangements are shown in Figures 2 and 3 for Public Service Company of New Mexico and Figures 4 and 5 for El Paso Electric Company. PNM will use structure BD-500 as its major tangent structure, while EPE will use DT-12-E.

The two three-phase lines will use one two-conductor bundle per phase. The companies plan to use non-specular conductors--transmission lines specially treated to reduce glare. Each of the two conductors in the bundle will be 795,000 circular mil size with 26/7 ACSR (aluminum conductor, steel-reinforced) construction or its equivalent. This conductor has a diameter of 1.108" and consists of 26 aluminum strands wound spirally about a core consisting of seven spiralled steel strands. The aluminum strands carry the electrical current, and the steel strands provide mechanical strength. The two conductors in the bundle will have a horizontal spacing of 18 inches and will be supported in each phase position by a string of 18 sky grey, 5 3/4" x 10" suspension insulators attached to the "K" crossarm of the wood pole structure.

The wood poles will be Douglas fir treated with pentachlorophenol to prevent deterioration from weathering effects. Structure heights will average less than 80 feet above ground. Conductor

FIGURE 2 PUBLIC SERVICE COMPANY OF NEW MEXICO




DETAIL A
DETAIL B
DETAIL C
DETAIL D
SECTION A-A
NOTE
ALTERNATE METHOD OF GROUNDING
(USED WHERE GROUND RODS CAN NOT BE DRIVEN)
ARM SEPARATION TABLE
REVISIONS
PUBLIC SERVICE Co OF NEW MEXICO
345 KV
TANGENT STRUCTURE
BD-500

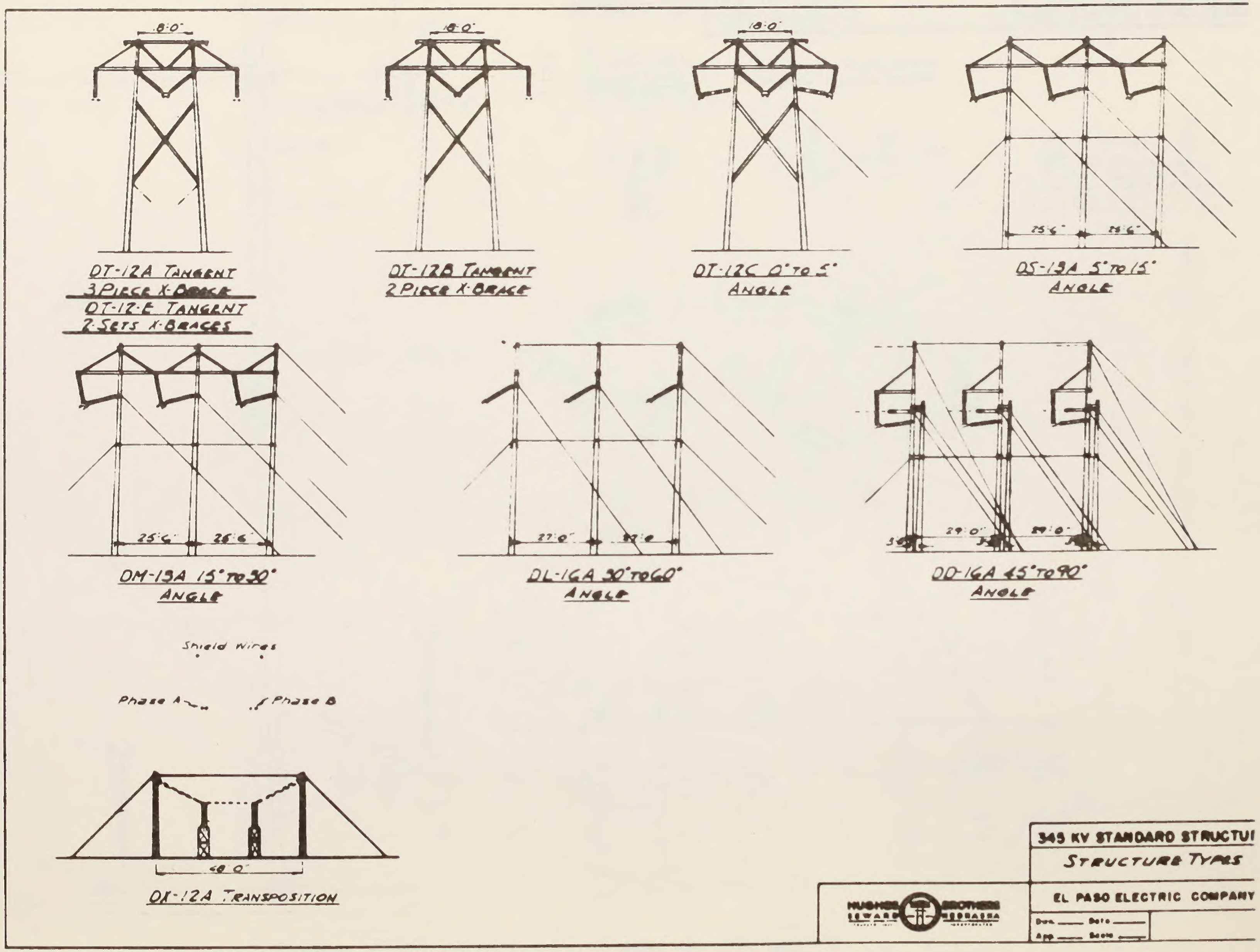
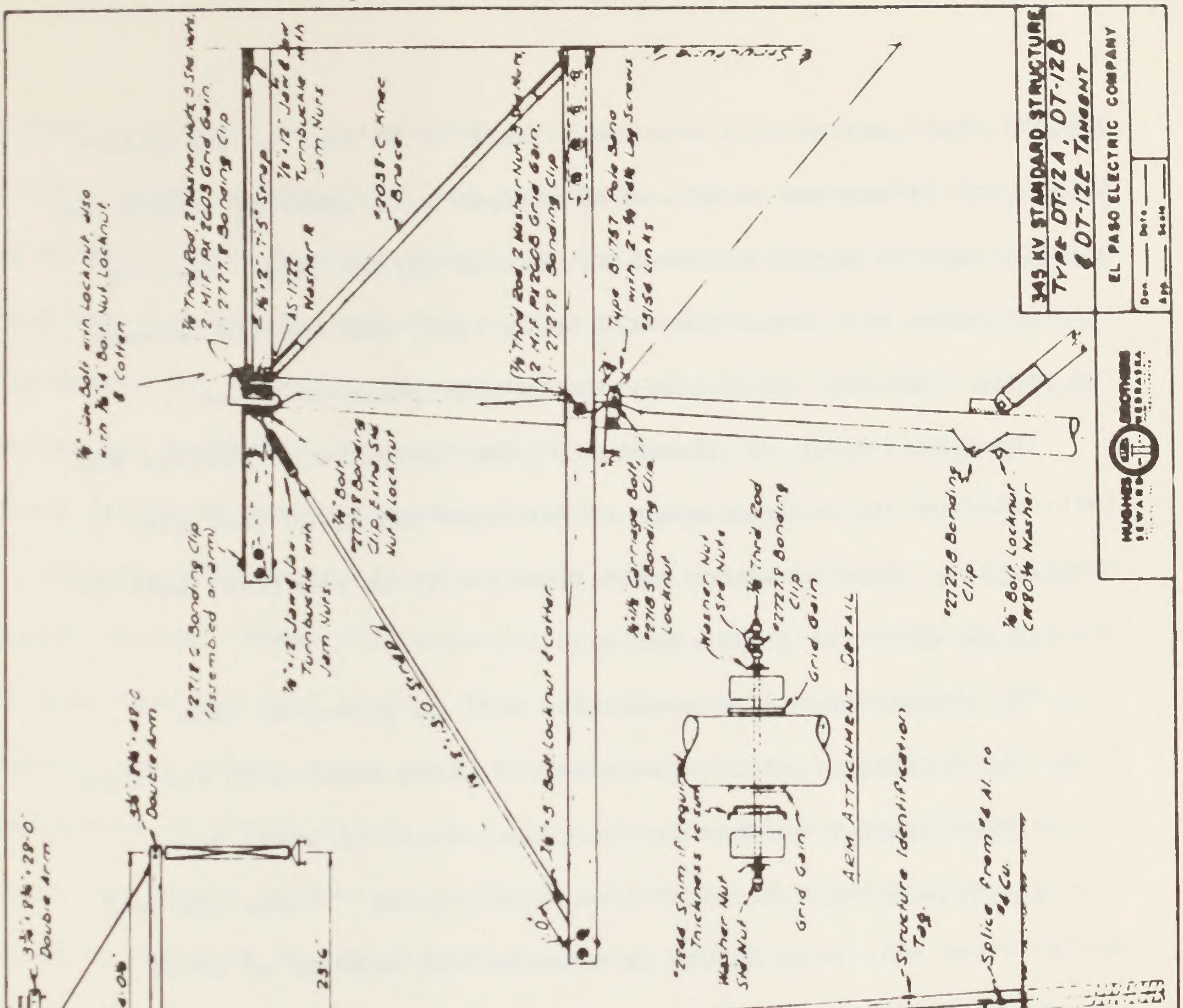

18'0"
DT-12A TANGENT
3 PIECE X-BRACE
DT-12-E TANGENT
2-SETS X-BRACES
18'0"
DT-12B TANGENT
2 PIECE X-BRACE
18'0"
DT-12C 0° TO 5°
ANGLE
25'6"
25'6"
DS-13A 5° TO 15°
ANGLE
25'6"
26'6"
DM-13A 15° TO 30°
ANGLE
27'0"
DL-16A 30° TO 60°
ANGLE
29'0"
DD-16A 45° TO 90°
ANGLE
Shield Wires
Phase A
Phase B
40'0"
DX-12A TRANSPOSITION
345 KV STANDARD STRUCTU
STRUCTURE TYPES
EL PASO ELECTRIC COMPANY
HUGHES BROTHERS
SEWARD NEBRASKA

Figure 5 EL PASO ELECTRIC COMPANY



heights above ground will average 51 feet to 55 feet at the structures, and clearances to ground at midspan will equal or exceed the height required by the National Electrical Safety Code. Spacing between poles in a structure will be 26 feet, and spacing between the phase conductor bundles will be 29 feet phase-to-phase.

The span length, or distance between towers, will average 800 feet; minimum and maximum spans of 500 feet and 1,700 feet are conceivable. Approximately 1,650 towers will be required, with an average of about 6.6 towers per mile.

The transmission line conductors will be protected from lightning strikes by two overhead shield wires mounted on the tops of the wood poles and connected by ground wires to steel rods driven into the earth at the bottom of the poles. These overhead shield wires will be 3/8-inch in diameter and made up of seven strands of extra-high-strength (EHS) steel. The resulting shield angle of protection against lightning strikes will be equal to or less than 30 degrees.

Metal hardware is used to fasten the wood structural members of the wood poles to ensure that the wood pole structures meet the required structural and mechanical requirements for supporting the conductor arrangement selected for these transmission lines. The overhead shield wires and the conductors will be equipped with armor rods and dampers to minimize wind-caused line vibration that could produce mechanical fatigue and possible breaking of strands. The armor rods are preformed reinforcing strands of metal about

3½ feet long wound spirally about the conductor at the insulators, which is their point of support at the structure. Their purpose is to prevent the conductor from bending sharply at the point of support. The dampers are mechanical weights attached to the conductors near the structure to help dampen out conductor vibration from wind. Both the armor rods and dampers are mechanically contoured to be smooth, so as to minimize corona discharge during transmission line operation.

Spacers will be installed on each phase bundle at equal intervals between towers. These will separate the conductors, with the spacers not more than 250 feet apart. This will prevent the two conductors from touching each other, which could develop burrs on the line and lead to development of corona discharge. The spacers and the hardware used to attach the bundle conductors to the insulator string are smoothly contoured to minimize corona discharges during operation.

Both the overhead shield wires and the bundled phase conductors will be installed using the tension stringing method in which neoprene-covered pulley wheels are attached to the insulator strings and the conductor pulled under tension through the pulleys off the conductor reels. The tension on the conductor is kept adjusted during the stringing operation to prevent ground surface contact that might scratch or burr the conductor surface. Keeping the conductor surface smooth without sharp burrs, scratches, or foreign material adhering to it minimizes corona discharge.

Compression-type splices will be used to join the conductors as they come off each reel. These splices are special sleeves inserted over the ends of the conductor and compressed around the two ends to form a good mechanical and electrical conducting connection between the conductors. They are designed to have smooth surfaces after compression and are corona-free.

The wood poles and wood structural members are designed to be field assembled into a complete structure and raised into position by conventional booms. The construction time and the necessary personnel for tower assembly are minimized by pre-mounting the metal hardware on the wooden tower members before delivery to the installation site.

2. Preconstruction Survey and Design

In order to complete a final design and determine the exact line location prior to construction, it will be necessary to make a field survey of the approximate center line of the proposed route.

Field survey will be performed by a survey crew using four-wheel-drive vehicles for access along existing roads as much as possible. No roads will be constructed during this phase of activity. Only a minimum amount of vegetation will be removed to allow the operation of surveying instruments.

Approximately every 2,000 feet along the line, a panel of white plastic will be placed on the ground. Distances between the panels and their relationship to land survey markers will be

determined by ground survey. After the ground survey is completed and the panels are in place, the route will be photographed from the air. After photographing the route, the panels are removed. Aerial photographs, with ground control shown on them, will then be used to plot the exact line and tower locations for the final power line design.

3. Construction - Equipment and Procedures

The following major pieces of equipment are normally used in the construction of these lines:

1). Wagon drill (mounted on the back of a D-8 cat), used to test for rock;

2). Digger (a large auger mounted on the back of a D-8 cat), used to dig pole and anchor holes;

3). Setting rig (a large cable rig pulled by a D-8 cat or crane), used to raise and set the structures;

4). Framing truck (a 6x6, or one in which all six wheels drive), carries crew and material to assemble the structures;

5). Air compressor with tamps (mounted on a 6x6 truck), used to tamp the soil around the poles after a structure is in place;

6). Air compressor for the ground rods (somewhat smaller than a tamper, but also mounted on a 6x6 truck), used to drive grounding rods into the ground;

7). Hauling equipment, large flat bed for crossarm materials and pole trailers to distribute poles;

8). "A" frames mounted on 6x6 trucks used for material unloading;

9). Fork lifts used to unload poles and frame the structures;

10). High reach, used for aerial framing and clipping;

11). Winch truck, used to realign structures pulled out of alignment during conductor stringing;

12). D-8 cat with ripper used to put in counterpoise; and

13). An estimated 15 to 20 pickup trucks for supervisory and other personnel.

In addition to the above equipment, other large pieces of equipment must reach certain towers. These large vehicles are a puller and a tensioner. They must reach each tower at which a significant change in direction is made, as well as every dead end structure. There is no need for them to follow the entire access road. Also, wire hauling rigs must get to the line about every three miles. These again need not follow the right-of-way for the entire distance.

Normally, storage space for structural components (i.e., poles, conductors, cross members, etc.) is obtained adjacent to railroads, highways, or roads. Such staging areas can normally service construction sites 15 miles distant or further depending on the availability of suitable roads in the area. If railroad or highway facilities are too remote, staging areas are sometimes set up along the route itself and may be required at intervals as close as 20 miles, again depending on the availability of haul roads, terrain, and other factors. Staging areas set up along the route would range from 2 to 5 acres in size. However, in checking with PNM, they feel that adequate storage space can be obtained near the railroad at Lordsburg and Deming, New Mexico. Therefore, remote staging areas will probably be uneccessary for the first phase of the project. Likewise, EPE feels that adequate storage is available along highways and railroads for phase two of the project.

A possible exception is that area between the Newman Power Station and Interstate 10 near Vado, New Mexico. A company spokesman said that they had constructed a powerline in this area before without the need for storage areas along the route. However, they could not rule out this possibility because the proposed line would run east to west, whereas previous lines ran north to south.

The 20 mile interval will allow travel to tower sites for 10 miles in each direction along the right-of-way from each staging area. Existing roads will be used wherever possible for the transportation of materials and equipment from the storage yards to the points where they are needed along the transmission line right-of-way. The maintenance road which parallels El Paso Natural Gas Company's older pipeline along two stretches totaling approximately 44 miles will not be used, however, because of the gas company's concern that its facilities might be damaged due to the age of the pipeline. Therefore, equipment and structural components must be hauled along the transmission line right-of-way itself where this applies.

The company estimates that 20 vehicles will visit a given tower site and that 30 to 40 vehicles will probably pass over a given piece of road.

Most of the prime route will permit blade up operation. "Blade up operation" is the term used when terrain and vegetation are such that access is possible along the right-of-way without blading a trail or road. In areas of very rough terrain or dense vegetation at least 2 feet high, a trunk road may have to be constructed to provide access to the right-of-way. In such areas, spur roads are often required to

provide access from the trunk road to the tower or structural site. A 50' x 100' area is required at each tower site to provide a suitable working surface for equipment and assembly of the towers. Depending again on the nature of vegetation and terrain, a certain amount of clearing and/or leveling is often required to provide a suitable assembly pad. A grader and/or D-8 cat are used for all clearing and construction of access and assembly pads.

At each assembly pad, a wagon drill mounted on a D-8 cat drills a small circumference hole to test for rock. Explosives are only used if rock is encountered where the poles are to be set. Then an auger, also mounted on a D-8 cat, drills the holes into which the poles and anchors of the tower will be placed. These holes are approximately 3 feet in diameter, only slightly larger than the poles, and average approximately 11 feet deep. Pickups or carryalls are used to transport the men performing this operation.

Towers are assembled on site after the necessary holes have been drilled. Flat beds, pole trailers, and "A" frames are used to haul and unload materials along the right-of-way. With the material on site, the area where the tower is to be assembled and set must be cleared so that the framing crew can work. These crews use "A" frames, fork lifts, and high reaches to aid in moving and adjusting material during the framing operation. Again, pickups are used for transportation.

The setting crew follows behind these operations. It uses a setting rig with a D-8 cat (or a crane mounted on a large flatbed truck), a winch truck, and a compressor truck to raise, set and adjust

the structure. Then the holes are back-filled and tamped to firm the structure. Very little excess excavated material is left after backfilling. That which is left is levelled off or distributed around the base of the pole. Concrete footings will not be required. The 5 to 10 men usually involved use pickups and carryalls for transportation.

After erection of the towers, conductors and shield wires are tension strung. This is accomplished by first threading a cable or sock line (5/8" non-twisting steel cable) from tower to tower, using tag lines which have been previously positioned on the towers' cross members. The light-weight "sock" line is then used to pull the conductor cable from tower to tower. A truck or other heavy duty vehicle, equipped with a mechanical cable reel, is stationed at one end of a span up to 17,000 feet in length. At the other end of the span, another truck is stationed. It is fitted with tensioning equipment which maintains the tension needed to keep the conductor off the ground while it is being pulled by the cable reel truck perhaps three miles away. Radios are used for communication during this operation. Two cable reels are normally used to pull two cables at a time. Two 17,000-foot lengths of cable can be pulled at a speed of 15 to 20 miles per hour on level terrain. In rough terrain, the speed may be reduced to 3 to 5 mph. No road is required between towers for this operation. Access is needed only to the pulling points at 17,000-foot intervals. This method of stringing line under tension poses little possibility for damage to the conductor, holding to a minimum future operational problems in radio and television inter-

ference, electromagnetic radiation, corona losses, and structural integrity. Once the conductor has been fully threaded, a splicing rig comes through to splice the conductors together. Wooden planks are often used to keep the conductor off the ground prior to final suspension and tensioning. After the conductors and overhead shield wires are pulled, spliced, and sagged, the conductors are "clipped."

"Clipping" crews move in at this point to secure the conductor bundles to the insulator strings and remove the temporary pulleys. These crews usually consist of three men and a vehicle equipped with a high lift used to hoist men and equipment up the towers. Normally, two men work on the towers, while the third man supplies materials to the workers above. Although this operation is possible with a ground vehicle, the crews prefer to use a high lift to hoist them and their equipment up to the towers. At a typical tower site, at least 10 "hoists" are made.

After the clipping crew has attached the conductor bundles to the insulator strings and removed the pulleys, spacers are placed between the conductor bundles at about 200-foot intervals. These keep the conductors from touching and reduce wind vibration. Most of the spacer installation is done by men riding aerial cars on the conductor cables. Only limited ground vehicle support is required for this operation. However, some of the aerial cars are not self-propelled. In these cases, a car may be pulled either by a vehicle travelling cross-country or by hand along the conductor cable by the man in the aerial car.

The overall wire operation produces the greatest amount of litter and other discard material of any phase of line construction. Tremendous waste materials come from packing and crates from the insulators and associated hardware; paper from between the layers of conductor on the wire reels; lagging to keep the conductor from dragging on the ground during pulling; the wire reels from the overhead shield wires; and short pieces of conductor at splice points and pulling sites. Nevertheless, most of this waste material originates and remains at the staging areas, rather than along the line.

Grounding may come before or after the stringing and clipping. For grounding, pickups, compressors, and D-8 cats with rippers are used, the latter to open trenches for counterpoise when grounding rods can not be used. All structure hardware will be grounded, as will all adjacent fences, gates, and similar devices. Ten-foot ground rods are used where feasible to ground fences and gates. All poles will be butt-wrapped using #4 copper wire. Down leads on poles will be #4 aluminum, splicing to the copper 18 inches above ground level.

Where it becomes necessary to pass through fences, the fence strands will be cut and an extra post added to make a temporary Texas style gate. No permanent gates will be installed, and the fence will be restored to its original condition when construction is completed.

At each crossing of a pipeline by the proposed power lines, wherever possible an angle of at least 45 degrees between the pipeline and transmission

lines will be maintained and towers will be installed at least 100 feet from the pipeline. A vertical ground clearance equal to or greater than the requirements of the National Electrical Safety Code will be maintained at these crossings. The BLM will consider the need for additional stipulations on crossings of existing facilities in connection with the right-of-way grant.

The total work force required to complete the phases of construction described above is 25 to 30 people. These people normally take up temporary housing in nearby communities and commute to and from the job site on a daily basis. Many have their own trailers and park them in trailer parks, others occupy rental houses and apartments. Generally speaking, only these supervisors and inspectors who occasionally visit the work site will be using motel accomodations.

Construction time is estimated as follows:

Greenlee County, Arizona to Hidalgo substation - 6 months

Hidalgo substation to Deming, New Mexico - 6 months

Deming to El Paso, Texas - 9 months

Once the line is finished, the access road will no longer be needed and can be returned to its natural state. Routine line patrols will be performed monthly by helicopter. Ground maintenance will depend on the aerial patrol findings, with little maintenance anticipated. When it becomes necessary to perform maintenance on any structure or replace insulator bells, the particular tower affected must be reached by equipment which will generally constitute a high reach and a few pickup

trucks. These vehicles will use existing roads where possible, traveling overland when necessary. As with most major transmission lines, a communications system is planned in conjunction with the line.
This system will utilize one of the conductors and no additional facilities will be required.

After line construction is completed, any reseeding or other actions deemed necessary by the appropriate agencies will be accomplished. The company believes the transmission lines will remain after the end of their assumed 50-year life span, perhaps modified, but still required for a utility corridor.

C. The Routes

1. Selection of Corridor Routes and Alternatives

In the construction of any transmission line between two points, an extremely large number of possible corridor routes exists. A detailed, objective analysis of the potential environmental impact of all possible routes, while desirable, is not always practical due to limitations of manpower, time, and finances. The possible alternative routes, therefore, must be narrowed to a manageable number with the use of subjective criteria. One method of limiting the many possible routes to a few chosen for detailed analysis is the use of on-site discussions and evaluations by specialists. This approach was used to select corridor routes for the proposed 345 KV lines, with experts in the areas of environmental analysis, land management, and line construction participating. In this connection, the term "corridor" refers to the route over which the two proposed lines would pass.

The criteria used for evaluating alternative routes and selecting those for detailed study are listed below. The order in which they are listed does not indicate priority. The relative weight given each criterion in the decision-making process was determined by consensus of the group of specialists.

a. Where feasible, existing power line, pipeline, or railroad corridors were followed in an effort to restrict potential impacts to areas already affected.

b. Existing communication systems were avoided to the extent necessary to alleviate potential interference problems.

c. Transmission line reliability as affected by the number of major angle points and the proximity to existing transmission lines was considered.

d. Corridors that would open new areas to vehicular traffic were avoided where possible.

e. Critical watershed areas were avoided where possible.

f. Areas that were being considered for wildlife management programs were avoided.

g. Unnecessary crossings of fragile riparian habitats were eliminated.

h. Alternative routes which would interfere with present or future air traffic around municipal airports were eliminated.

i. The necessity of supplying electrical power to other utilities and communities was considered.

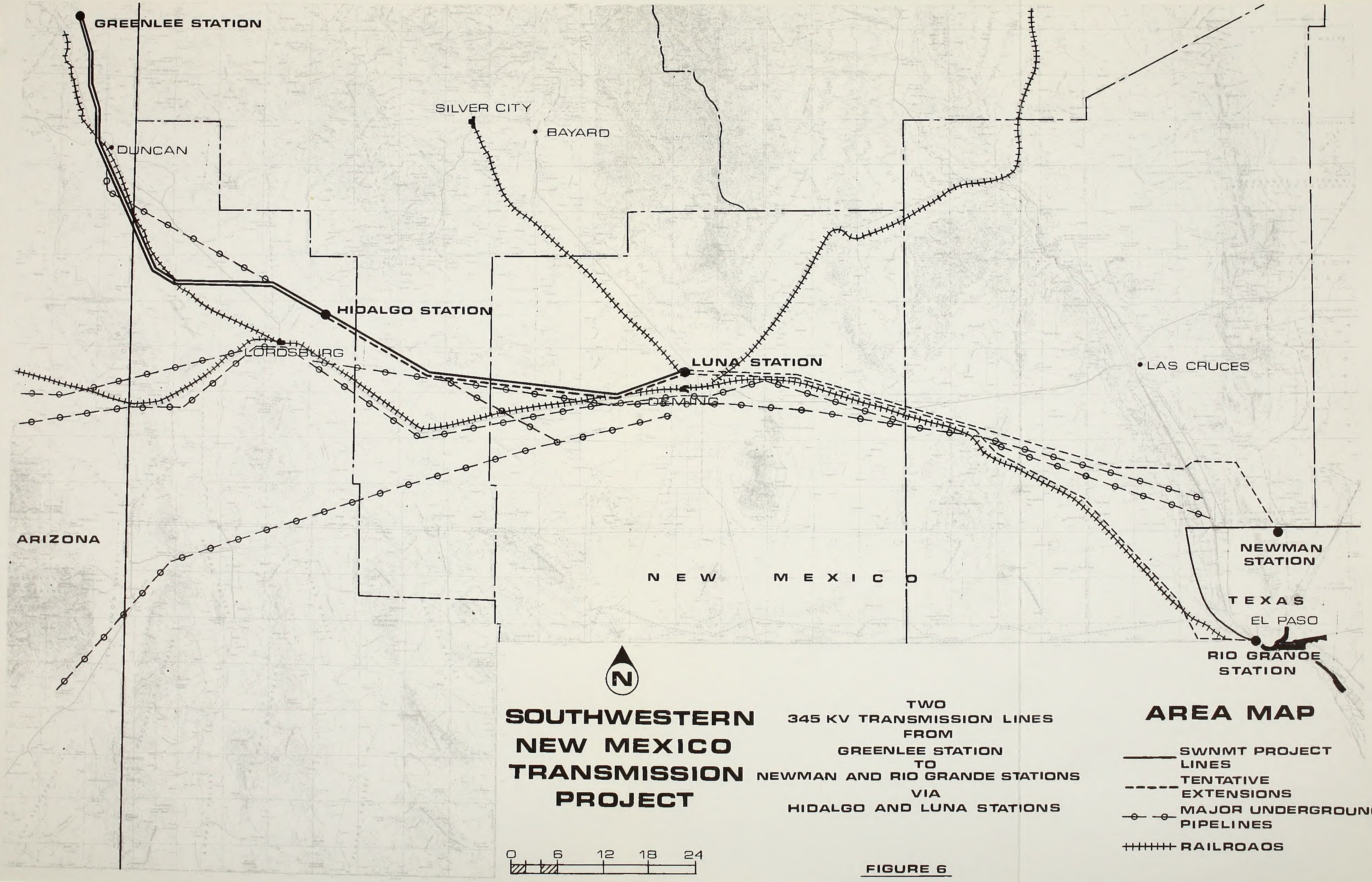
j. The scenic value of certain areas was considered.

The first meetings to evaluate possible corridor routes were held on August 1 and 2, 1973, during a field trip which began at the Newman Power Station at El Paso, Texas. A team of representatives from El Paso Electric Company, New Mexico Environmental Institute, and the Las Cruces District, Bureau of Land Management, travelled the proposed route from the Newman Power Station to

Lordsburg, New Mexico, and on to T. G. & E's Greenlee substation in Greenlee County, Arizona. Several alternate routes were examined and their relative merits discussed. On August 8, 1973, the same representatives discussed the various possible routes further. At that time it became apparent that certain other potential routes between Lordsburg and the Greenlee substation should be examined. Hence, a second field trip to accomplish this was made on August 16, 1973. At a subsequent meeting on August 21, 1973 certain routes were selected for more intensive study, based on mutual agreement among the participants in consideration of the criteria listed above. The routes thus selected were subsequently evaluated by New Mexico Environmental Institute (NMEI) and reported upon in an environmental study prepared for EPE and submitted to BLM in December 1973. Much of the information in that report has been incorporated here.

The BLM in February 1974 began its formal evaluation of these routes through a team of recreation, wildlife, watershed, geology, and environmental specialists. At its first meeting, the team added two other possible routing alternatives to those already under consideration: Interstate 10 between the New Mexico towns of Deming and Lordsburg, and Highway 70 between Lordsburg and Duncan, Arizona.

The BLM team began field reviewing the various routes on February 6, 1974, initially concentrating in the area west of Lordsburg which at the time was the most controversial. The study

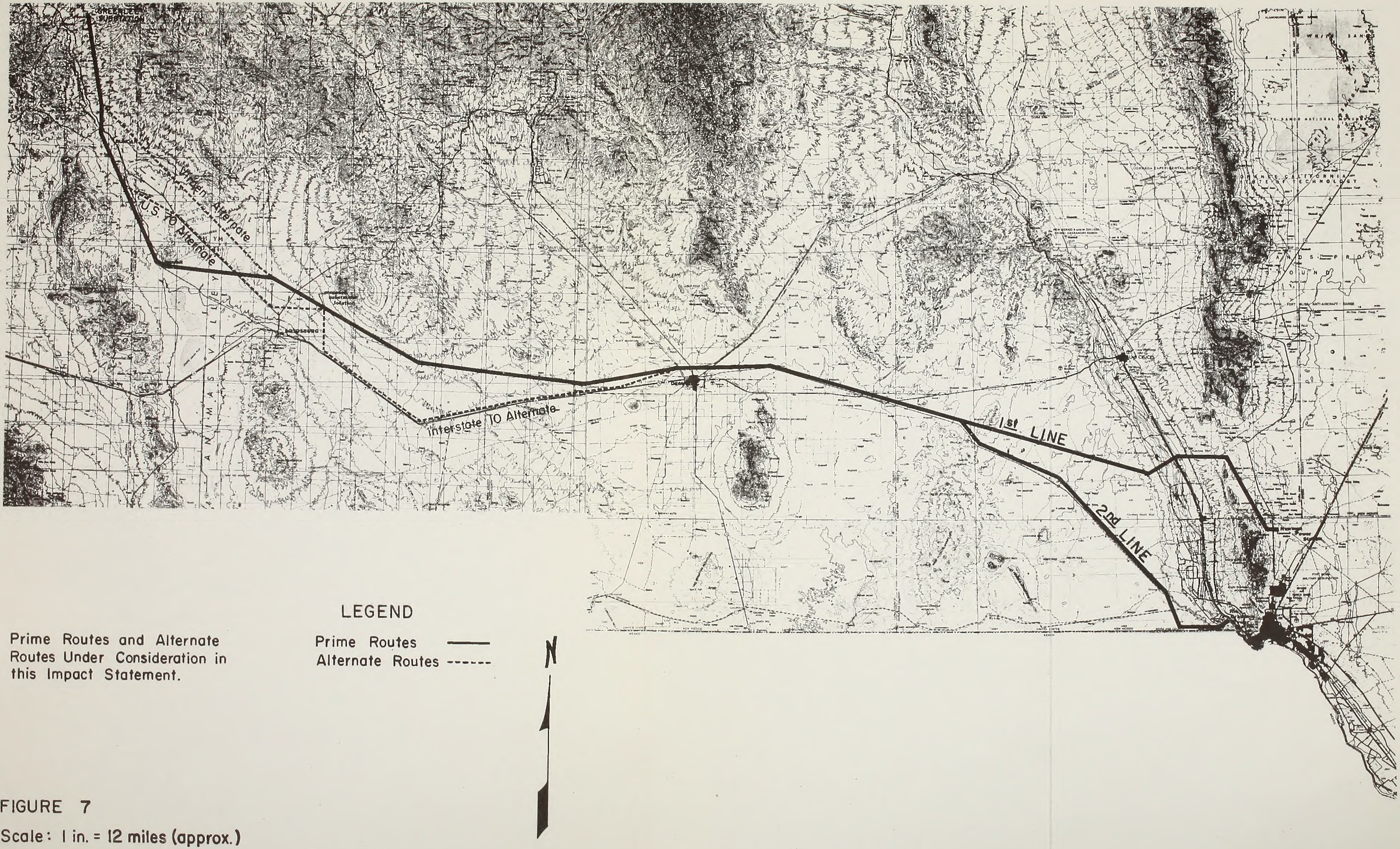

GREENLEE STATION
SILVER CITY
BAYARD
DUNCAN
HIDALGO STATION
LORDSBURG
LUNA STATION
DEMING
LAS CRUCES
ARIZONA
NEW MEXICO
NEWMAN STATION
TEXAS
EL PASO
RIO GRANDE STATION
N
SOUTHWESTERN NEW MEXICO TRANSMISSION PROJECT
TWO 345 KV TRANSMISSION LINES FROM GREENLEE STATION TO NEWMAN AND RIO GRANDE STATIONS VIA HIDALGO AND LUNA STATIONS
AREA MAP
SWNMT PROJECT LINES
TENTATIVE EXTENSIONS
MAJOR UNDERGROUND PIPELINES
RAILROADS
0
6
12
18
24
FIGURE 6

of routing alternatives in succeeding weeks indicated that the route following the railroad from Lordsburg, New Mexico, to Duncan, Arizona was much more favorable from an environmental standpoint than the other routes being considered. These initial findings were discussed with El Paso Electric Company, which in turn initiated its own review of the routing alternatives. As a result of its findings, mutual agreement was reached and a prime route was selected between Lordsburg, New Mexico and Duncan, Arizona. This route varies only slightly from that studied by New Mexico Environmental Institute and will be described in detail in the next section.

Routing considerations in Arizona were coordinated through the Safford, Arizona District Office of the Bureau of Land Management. Through BLM land use planning procedures, the Safford Office recommended a utility corridor extending almost due south from the Greenlee substation and crossing the Gila River at the same location that an existing pipeline crosses. This corridor can be conveniently intersected by all routing alternatives being considered and, therefore, was adopted in lieu of the Arizona routing previously considered by NMEI. As discussed in detail elsewhere, the prime route selected in this fashion follows a de facto utility corridor along with several other facilities.

2. Description of the Routes Studied in this Environmental Statement

The previously described phases of construction will not be referred to in remaining portions of this report. Rather, all



LEGEND

Prime Routes ———
Alternate Routes ------

Prime Routes and Alternate Routes Under Consideration in this Impact Statement.

FIGURE 7

Scale: 1 in. = 12 miles (approx.)

discussions will be related to the proposed routes (prime and alternate) shown in Figure 7. Each route is described in detail below. The terms first and second lines, as used hereafter, refer primarily to the routing divergence required to reach El Paso Electric Company's separate substations at El Paso, Texas. To make this divergence clear in a convenient manner, the routes shown in Figure 7 are set forth in the following discussion on an east-to-west basis, although the proposed construction itself would start from the western terminus with the first phase. For consistency, the east-to-west orientation is largely adhered to thereafter. Reference to Figure 10, page 81, may also be helpful during discussion of the alternate routes.

The Prime Route (First Line)

The proposed route of the first line begins north of El Paso, Texas, at El Paso Electric Company's Newman Power Station, 1 mile south of the Texas-New Mexico boundary and ½ mile east of the War Highway. (See Photos 1-12 for pictures of routes.) The route crosses War Highway, State Highway 404, immediately west of the power station and continues due west for approximately 1 mile beyond the highway until it intersects the Newman-West Mesa 345 KV line. It then runs parallel to that power line in a northwesterly direction for approximately 11 miles to a point north of the Franklin Mountains and east of Vado, New Mexico. The route angles here and travels due west for almost 5 miles to Interstate Highway 10,

crossing the interstate just south of the Vado Interchange. A crossing for the Rio Grande Valley has not been selected; it is proposed that the line cross at a southwesterly angle and emerge approximately 2 miles north of El Paso Natural Gas Company's pipeline right-of-way. Here the line straightens again to a northwesterly angle for another 9 miles until the gas pipeline rights-of-way are intersected. The proposed transmission line maintains a 1,000-foot separation to the north of the Southern Pacific pipeline right-of-way to avoid interference with the operation and maintenance of the pipeline. The transmission line route parallels the pipeline in a northwesterly direction for approximately 19 miles to the point at which the Southern Pacific Railroad intersects the pipeline. At this point, the pipeline angles toward a more southerly route toward Deming, New Mexico, while the railroad assumes the angle of travel previously held by the pipeline. The transmission line route parallels the railroad for 26 miles, crossing Interstate 10 again near Akela, New Mexico and leaving the railroad near Carne, New Mexico, a railroad siding station 9 miles east of Deming. The route proceeds due west, passing north of Deming and north of the junction of State Highway 26 and U. S. Highway 180. Here again, the routing around Deming can be described only generally because rights-of-way across private land are not yet firm. Once past Deming, the route heads southwest to the junction with El Paso Natural Gas Company's

Photograph #1

Prime route - the Southern Pacific railroad. Photo taken at junction of Interstate 10 & railroad between Las Cruces & Deming.

Photograph #2

Prime route - the pipeline between Deming & Lordsburg. Looking west.

Photography #3

Prime route - the pipeline west of the proposed Lordsburg substation.

Photograph #4

Prime route - looking west down the Southern Pacific railroad towards Summit. The Summit hills are in the right side background.

Photograph #5

Prime route - the proposed crossing point of the Gila River. Photo taken from south side of valley looking north.

Photograph #6

Prime route - view of the terrain along the proposed route between the Gila River and the Greenlee Substation.

Photograph #7

Prime route - the Greenlee Substation under construction January, 1974.

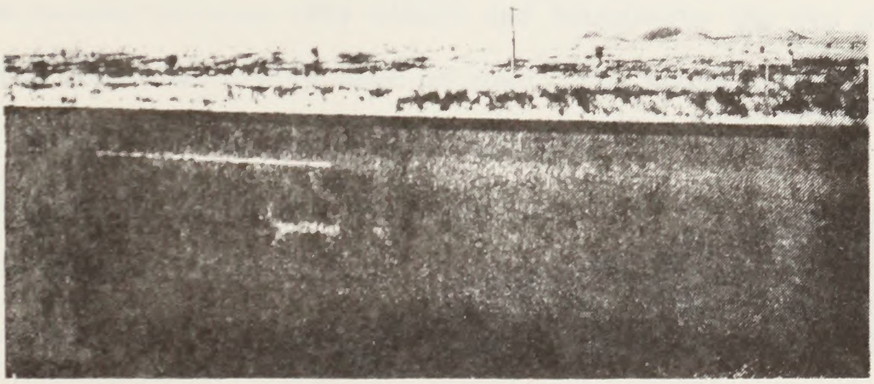
Photograph #8

Virden alternate - the lower box of the Gila River. The Virden alternate passes $1\frac{1}{2}$ miles south of this point.

Photograph #9

Virden alternate - the Virden valley. The route would pass diagonally from right to left through photo.

Photograph #10



U.S. 70 alternate - looking south across U.S. 70 on the Lordsburg mesa.

Photograph #11

U.S. 70 alternate - looking northward from U.S. 70 on the Lordsburg mesa.

Photograph #12

Interstate 10 alternate - photo taken while traveling east showing the degree of intrusion presently existing along the highway.

pipeline at a point approximately 9 miles west of Deming. The proposed point of intersection is approximately 3/4 mile north of Interstate 10 and just west of the El Paso Natural Gas Company Compressor Station. The route parallels this pipeline almost due west for 25 miles to the point at which it intersects another pipeline route traveling northwesterly toward Duncan, Arizona. The prime route follows this pipeline for almost 16 miles to the proposed location of the Lordsburg substation in the NW¼ of Section 16, T. 22 S., R. 17 W., NMPM. From the substation, the route continues along the pipeline for another 8 miles, then angles to the west in a direct line toward Summit, New Mexico, an old livestock loading station on the Southern Pacific Railroad between Lordsburg, New Mexico and Clifton, Arizona. This leg of the route crosses Highway 70 about 8 miles northwest of Lordsburg. The route angles again to the northwest at Summit, crosses the railroad and then follows it as closely as possible while retaining a straight line. This routing passes approximately ½ mile southwest of the Duncan, Arizona city limits and intersects the gas pipeline slightly more than 1 mile west of town. The route then turns north up the pipeline and crosses the Gila River at the same location as the pipeline. The route continues due north for another 3 miles, then veers slightly to the west on a direct line for the Greenlee substation located 1½ miles east of the Greenlee County Airport.

<u>The Prime Route (Second Line)</u>

The east-to-west route for the proposed second line begins at El Paso Electric Company's Rio Grande Power Station located west

of downtown El Paso near the Rio Grande and the International Boundary with Mexico. The route proceeds westerly from the power station for approximately 6 miles, then northwesterly to intersect the Southern Pacific Railroad approximately 1 mile east of the Strauss, New Mexico, railroad siding. From there, the route parallels the railroad as closely as possible until it intersects the first line route from the Newman Power Station described above. The junction is the point at which the Southern Pacific Railroad crosses El Paso Natural Gas Company's pipeline about 30 miles west of Vado, New Mexico. From this junction point, the first and second lines would parallel each other within the same right-of-way to the Greenlee substation in Arizona.

Alternate Routes West of Lordsburg

Two alternate routes are considered between Lordsburg and the Greenlee substation: The Virden alternate and the U. S. 70 alternate.

The Virden alternate (Alternate 3 in Figure 10) would follow the pipeline for approximately 7 miles west of the Lordsburg substation, then angle northward toward Virden, New Mexico, following no existing right-of-way or other access. This route would cross the Gila River at Virden and continue another 9 miles to a point 4 miles north and 1 mile west of Duncan. Then it would angle sharply to the north and go directly to the Greenlee substation. This route was originally proposed by El Paso Electric. As indicated earlier, the company now favors the prime route.

The U. S. 70 alternate route would follow U. S. Highway 70 for most of the way between Lordsburg and Duncan. From the Lordsburg substation, the route would proceed directly west for 7 miles to reach the highway, passing 2¼ miles north of Lordsburg. Then the route would follow U. S. 70 for 16 miles to the point at which the pipeline crosses the highway. At that point, the route would again follow the pipeline until it intersects the proposed prime route described earlier. The U. S. 70 alternate was proposed for study by the BLM environmental impact study team to determine the value in following the highway compared with other routing considerations, (Alternate 2 in Figure 10).

Alternate Route East of Lordsburg

One alternate route is considered between Lordsburg and Deming: The Interstate 10 Alternate.

This alternate route (Alternate 1 in Figure 10) would leave the prime route in the vicinity of its junction with the El Paso Natural Gas pipeline approximately 9 miles west of Deming and would join the routing of nearby Interstate 10. Thereafter it would follow the north side of that highway to a point approximately 4 miles east of Lordsburg at which the alternate power line route would head directly north to the substation northeast of Lordsburg. The Interstate 10 route is also occupied by the Southern Pacific Railroad and several overhead utility lines. Total length of this alternate from the point at which it joins Interstate 10 to the Lordsburg substation is approximately 48.4 miles.

Table 4 shows populations of cities and towns, along the route and Table 5 shows the number of crossings (highways, railroad, pipelines, powerlines and rivers) made by the proposed 345 KV lines.

TABLE 4

POPULATIONS OF CITIES AND TOWNS ALONG ROUTE

El Paso, Texas	358,938
Las Cruces, New Mexico	41,000
Deming, New Mexico	12,000
Lordsburg, New Mexico	5,200
Duncan, Arizona	1,000

All figures quoted by the local Chamber of Commerce as of July 1974.

Table 5 Number of Crossings (Highways, Railroad, Pipelines, Powerlines, and Rivers) made by the proposed 345 KV lines

	Prime Route - one Newman Substation to Intersection with Prime Route - two (1 line)	Prime Route - two Rio Grande Substation to intersection with Prime Route - one (1 line)	From intersections of Prime Route (one and two) to Greenlee, Arizona (2 lines)	Interstate 10 Alternate (2 lines)	Virden Alternate (2 lines)	US 70 Alternate (2 lines)
<u>Highways</u> <u>1/</u>						
Primary, all weather hard surface	1	1	10	-	-	6
Secondary, all weather hard surface	3	1	8	-	6	2
Light duty, all weather improved surface	12	-	14	12	8	6
Fair or dry weather unimproved surface	1	10	32	8	4	8
<u>Railroads</u> <u>2/</u>	1	4	6	-	-	2
<u>Pipelines</u> <u>3/</u>	1	-	2	-	-	-
<u>Powerlines</u> <u>4/</u>	2	2	8	-	-	-
<u>Rivers</u> <u>5/</u>	1	1	2	-	2	-

<u>Impacts are discussed for these crossings in the following sections</u>

1/ III A-6b(3); III-A7; III-D2b.
2/ III A7; III-D2b.
3/ III A-6b(3); III-A7; III-D2b.
4/ III A-6b(3); III-A7; III-D2b.
5/ III-A6b; III-D2b; IIB-1.

II. DESCRIPTION OF THE ENVIRONMENT

A. Non-Living Components

1. Topography

The entire proposed route lies within the Basin and Range Physiographic Province. This province has narrow, generally north-south trending mountain ranges, with broad, gently sloped valleys. Along the proposed route the mountain ranges are isolated with the valleys interconnected. The proposed power line corridor and alternate routes remain in the valleys and avoid the mountain ranges.

From the Newman Station west to Lordsburg the power line would transverse flat to gently sloping topography with only a few small areas of steep or dissected terrain. Generally flat terrain continues for approximately 15 miles northwest of Lordsburg, depending on the route. North of this the terrain is deeply dissected and slopes are moderate to extreme. A more detailed description of the terrain along the prime route and each of the alternate routes follows:

a. The Prime Route for the First Line

From the Newman Power Station to approximately 1 mile north of the New Mexico state line, the proposed prime route passes over a moderately dissected terrain with slopes ranging from 10 to 20 percent. Numerous drainages run eastward, more or less perpendicular to the route, with relief from ridge top to arroyo bottom ranging upward to 40 and 50 feet. The remainder of

the segment from the Newman Power Station to the angle point north of the Franklin Mountains passes over generally flat to gently sloping terrain. Immediately west of the angle point, the route again enters moderately dissected terrain just east of the north end of the Franklin Mountains. Here, too, the ground is dissected with arroyos, but relief is generally less than 40 feet. As the route progresses westward to the Rio Grande Valley, it runs parallel to widely separated drainages and across gently sloping terrain.

The Rio Grande Valley is a flat flood plain. The sides of the valley are moderately dissected with arroyos, and the slopes range from slight to moderate from the mesa surfaces to the valley bottom. Vado Hill is an outstanding rhyolite butte on the east slope of the Rio Grande Valley near the proposed power line. The hill is currently being excavated for crusher material by a local construction company.

Once on the La Mesa surface, west of the Rio Grande, the route crosses mostly flat to gently rolling terrain all the way to Deming. One exception is in the vicinity of Aden Hills, where moderate slopes are encountered.

West of Deming to the Luna County line, the route crosses the flat basin of the Mimbres River. The outstanding features in this area are Black Mountain, northwest of Deming, and Grandmother Mountain, west of Deming. The route passes 2 to 3 miles south of these hills. The drainages in this area run southward with low gradients and gentle side slopes.

Approximately 6 miles west of the Luna-Grant County line, the route passes through the first of two large draws. These are Ninety-six Creek and the Burro Cienega. Each is approximately ½ mile wide, but only 40 to 50 feet below the neighboring land surface. Ninety-six Creek is about 3 miles west of the Burro Cienega drainage.

Some 8 miles west of Ninety-six Creek, the route enters the gently sloping piedmont of the Big Burro Mountains. This area is cut with numerous dry washes which run toward the southwest. Ridge to wash relief ranges from 5 to 20 feet. The site for Hidalgo Substation, proposed as part of the power line project, is on the lower reaches of this piedmont, approximately 3½ miles southwest of the base of the Burro Mountains. The substation would be located approximately 1,000 feet north of the pipeline right-of-way.

After leaving the Hidalgo substation, the route continues along the pipeline, crosses the Burro Mountains piedmont for another 7 miles, then angles almost due west toward Summit. After angling, the route remains on the extreme lower reaches of the Burro Mountains piedmont for approximately 3 miles. Over 2 of these 3 miles, the route travels directly down the drainage slope. The slope is so gradual, however, that only minimal erosion problems are anticipated. The remaining distance to Summit crosses terrain of flat to low relief with very gentle slopes. The regional slope is to the southwest. The only prominent relief in

topography between the angle point and Summit are two small isolated hills on either side of and adjacent to Highway 70. These hills and the southwestward regional slope should prove advantageous in shielding or backdropping the transmission lines in this area.

The Summit Hills are an isolated group of hills rising 460 feet above the surrounding plain. The route passes immediately south of the hills, angles there, and emerges on the west side on a direct line for the Gila River crossing west of Duncan, Arizona. To the west of Summit, the power lines would enter a moderately dissected terrain with gentle slopes and relief of 10 to 20 feet along the washes. This terrain continues for 7 miles along the west side of Railroad Wash. Only minor blading across the washes is needed. This would involve a grader or bulldozer scraping the surface to make it passable during construction. The route then emerges onto more gentle terrain in the area of the Arizona-New Mexico state line and continues north by northwest across the low relief and very gentle slopes characteristic of the lower reaches of the Peloncillo Mountains piedmont to a point just south of the proposed crossing of the Gila River.

After angling toward the Gila River crossing, the route enters a moderately dissected terrain with moderate to steep slopes and relief of 40 to 60 feet. However, the route runs parallel to an existing pipeline road; therefore, new access only to the structural assembly pads will be required. In this section

the pipeline road can be used without risking damage to the pipeline.

The Gila River Valley is about 120 feet deep and just over ½ mile wide at the point of crossing. As the river and valley are running east-west at this point, the power lines would cross at a right angle. The route passes over U. S. 70 as it enters the valley. Steep slopes of at least 40 feet in height are immediately adjacent to the highway on the south side. This terrain would serve as an effective shield to hide the power lines from view to the south of the highway.

On the north side of the river are deeply incised hills with steep slopes of 100 to 120 feet relief. The new State Road 75 passes through this area about 3/4 mile north of the valley. Steep relief on either side of this highway at the point of crossing would again shield the power lines from view. This time, however, the power lines would be shielded on both north and south.

From the Gila River north to the Greenlee substation, the power lines would traverse the piedmont which slopes gently to the west-southwest from the Steeple Rock portion of the Burro Mountains. This land form was formed by confluent alluvial fans and originally was a continuous surface. Since its formation, a change in climate or the lowering of base level along the Gila River has caused the tributaries crossing the piedmont to become deeply incised. This has produced long sloping ridges with flat tops and deep, steep-sided washes. These washes may

be narrow or broad but are often flat bottomed and fairly straight. The ridges become narrow and more dissected to the west. Relief along the power line route from ridge top to canyon bottom is 80 to 160 feet, with 100 feet about average. The ridges and canyons are at roughly a right angle to the power line route. Most of the canyons are very steep-walled with 100% slopes (45^{o}) being common. This portion presents the major topographical problem over the proposed routing. Extensive blading would be required to provide access to tower sites. The rough terrain is more or less continuous for 14 miles from the Gila River to the Greenlee substation. This final segment of the route would be used to reach the substation regardless of which routing alternative is used.

b. The Prime Route for the Second Line

The route of the second line from the Rio Grande Power Station northwest from El Paso, Texas to the intersect point with the first line crosses terrain nearly identical in description to that previously discussed for the La Mesa surface. This is generally flat and gently rolling. Trunk road access is provided by the railroad maintenance road.

One topographical feature is worthy of mention along this route. That is the Aden Lava Flow, located some 12 miles southeast of the intersect point of the first and second lines. This is a large field of jagged lava with an extremely rough surface which has not been smoothed by weathering. The proposed route passes close to the lava flow but does not cross it.

c. The Interstate 10 Alternate between Deming and Lordsburg

This entire route passes over an almost featureless plain of very low relief. The only features worthy of mention are the Victorio Mountains, a very small group of hills on the south side of Interstate 10 about six or seven miles east of the Luna - Grant county line. The route skirts around the southern end of the Burro Mountains piedmont.

d. The Alternate Routes West of Lordsburg

(1) The Virden Alternate

This route would continue west along the pipeline from the Hidalgo substation for just over 10 miles, then angle northwestward toward the Virden Valley. Topographically, the route crosses a flat featureless plain from the substation to a point some 6 miles southwest of Canador Peak, a prominent landmark immediately north of the Gila River and approximately 5 miles southeast of Virden. At this point, the route enters the Cottonwood Canyon drainage basin and immediately encounters an extremely dissected terrain with moderate to steep slopes betweeen arroyos. Cottonwood Canyon has a total watershed of some 12,000 acres and empties into the Gila River directly south of Canador Peak. The route crosses this watershed directly down the drainage slope for the first 3 miles, then becomes more or less perpendicular to the drainage slope as the route climbs out the west side of the

basin. The basin is approximately 5 miles wide at the proposed crossing point with a total relief of 200 feet from the edge of the basin to the bottom.

As the route leaves the Cottonwood Canyon drainage, it enters another stretch of extremely dissected, steep-sloped terrain along the south side of the Virden Valley. The route would side-slope through this terrain for 5 miles before entering the valley itself. Total relief from mesa to valley is more than 300 feet. Average ridge to gully relief for each of the numerous gullies in this area is 60 to 80 feet. Extensive blade work would be needed over the 5-mile stretch for equipment access and structural pads.

The Virden Valley is an agricultural area along the Gila River. The route crosses the valley diagonally for 3 miles and again enters rough terrain on the north side. The remaining distance to the Greenlee substation crosses country classified as "extremely steep, highly dissected, rough, broken alluvial materials" (USDA, 1969). Blade work would be required over the entire route north of the Virden Valley.

(2) <u>The U. S. 70 Alternate</u>

This alternative route would follow U. S. 70 northwest from Lordsburg across a flat plain. The only noteworthy topographical feature near the highway is a pair of low hills (Ninemile Hill) a few miles northwest of Lordsburg. Twenty miles from Lordsburg, the route angles slightly more westward to

follow the gas pipeline which crosses the highway and continues on to meet the proposed prime route. Five miles after leaving the highway, the route enters Thompson Draw, an area of highly dissected terrain having moderate to steep slopes with relief of 20 to 40 feet. The existing pipeline road would furnish trunk road access, since here again the pipeline is not old enough to present the risk of damage from passing equipment. Some blading would be required for spur roads and tower sites in this area.

After leaving Thompson Draw, the route crosses Railroad Wash and then crosses the same terrain as described for the prime route.

2. Climate

Climate is classified as arid-continental with wide temperature variations and sporadic rainfall. Average annual precipitation along the route from El Paso to southeastern Arizona is about 10 inches. The greater portion falls in July, August, and September. On the western end of the route, in the Virden area and north to the Greenlee substation, the rainfall averages 12 inches annually. Over the entire route the evaporation rate is considerably higher than the precipitation.

There are extreme fluctuations of precipitation from year to year, with periodic droughts. Late summer rains often come as brief scattered thundershowers. Occasionally these storms produce local floods. Fall and winter rains are more general in the area but

supply less moisture. On the average the mountain areas receive more moisture than the valleys, particularly from the thundershowers.

The area has a wide daily temperature range and generally clear skies. A typical winter day may have freezing temperatures at night, warming into the 60's or 70's during the day. Early summer temperatures will often top 100° Fahrenheit and cool to the 60's at night, due to the high elevation and dry conditions. Relative humidity ranges from 25% to 40% for the year.

The average wind velocity throughout the year is approximately 10 miles per hour with many calm days. Late winter and spring are more windy, with winds up to 60 miles per hour which cause dust storms and sandstorms along portions of the route.

3. Geology

a. General Description of the Geology of the Subject Area

The proposed route lies within the Basin and Range Physiographic Province which is characterized by fault-block mountains separated by intermontane basins filled with alluvial and lacustrine sediments.

Beginning at the east end, the proposed line passes along the west side of a graben, the Tularosa Valley. The line proceeds along the east side of the Franklin Mountains, a block of Paleozoic limestone which dips steeply to the west. Bishop's Cap, a faulted and mineralized hill of Paleozoic limestone and shale, is

located 6 miles north of the Franklin Mountains. Fluorite has been mined from Bishop's Cap in the past, and mineral exploration continues there.

The Franklin Mountains and Bishop's Cap rise above the Jornada Surface of Pleistocene age located east of the Rio Grande Valley.

The Rio Grande Valley has been cut through the La Mesa and Jornada Surfaces and into the underlying Santa Fe formation since Mid-Pleistocene. Faulting along the edges of the valley may have contributed to this entrenchment. The erosional surfaces along the valley edges expose the Santa Fe formation, which is dominantly composed of sand with interspersed units of gravel and clay. The material is unconsolidated and easily eroded. The Rio Grande Valley is a fluvial plain currently well controlled through channelization of the Rio Grande by the International Boundary Commission.

Along the west edge of the valley are several basaltic cinder cones with associated lava flows which postdate the formation of the valley itself. These cones are set on the La Mesa Surface, a static depositional surface of Pleistocene age which is mostly composed of sand and gravel with a sand veneer. Caliche is found either at or very near the surface over large areas. The route passes over the La Mesa Surface, generally from the Rio Grande to the vicinity of the Aden Hills.

The Aden Hills are volcanic andesite flows of Tertiary Age. South of Aden are the extensive cinder cones and basaltic flows of the West Potrillo Mountains. Although these are recent in geological terms (late Quaternary in age), there has been no volcanic activity here during historical times.

From the Aden Hills east of Lordsburg, the route passes over interconnected alluvium filled basins. In places, the Quaternary clastic sediments may be several thousand feet deep.

In the Duncan - Virden area, the Gila conglomerate forms the valley sides and piedmonts. Prominent hills such as the Summit Hills and the Black Hills are Tertiary and Quaternary basalt flows. Canador Peak, Rimrock and Black Mountain are volcanic flows of Tertiary-Datil formation.

b. Geologic Hazards

Most of the power line route from the Rio Grande to north of Lordsburg passes over Quaternary gravel and sand filled basins which function as great ground water reservoirs. Surface subsidence and earth fissures have occurred in similar basins in Arizona due to large scale ground water pumpage. The ground water level has reportedly dropped as much as 200 feet in these Arizona basins.

Not enough information is available to predict such subsidence in southwestern New Mexico; however, the Mimbres Basin in the Deming area would be the most likely area for its occurrence along the route. Although total ground water decline has been 50

to possibly 100 feet in this basin, there are several factors which limit the possibility of subsidence. Compared to basins in Arizona which have subsided, the Mimbres Basin has a slower rate of ground water decline, a faster recharge rate, and basin fill characteristics which may lessen the possibility of subsidence.

The environmental report completed by New Mexico Environmental Institute included a study on seismic risk to the power lines. Earthquake data were collected for the region enclosed by the heavy solid line shown in Figure 8. The boundaries of this region are 60 miles from the proposed route of the transmission lines. Table 6 lists earthquakes recorded within this region prior to 1962. The magnitudes of the earthquakes recorded for that period were measured on a Modified Mercalli Intensity Scale, which is a non-quantitative, subjective system based on observations by people and damage to structures. Possible intensities range from I to XII, with XII denoting total damage.

Table 7 outlines the earthquakes recorded in the region since 1962. Magnitudes for this period were instrumentally recorded on the Richter Scale.

By far the strongest earthquake recorded in the region occurred in the Mogollon Mountains 35 miles northeast of Duncan, Arizona on September 17, 1938. This quake produced slight damage at Duncan and was felt over 8,000 square miles. Numerous aftershocks were felt during the next 4 months. During the next 100 years

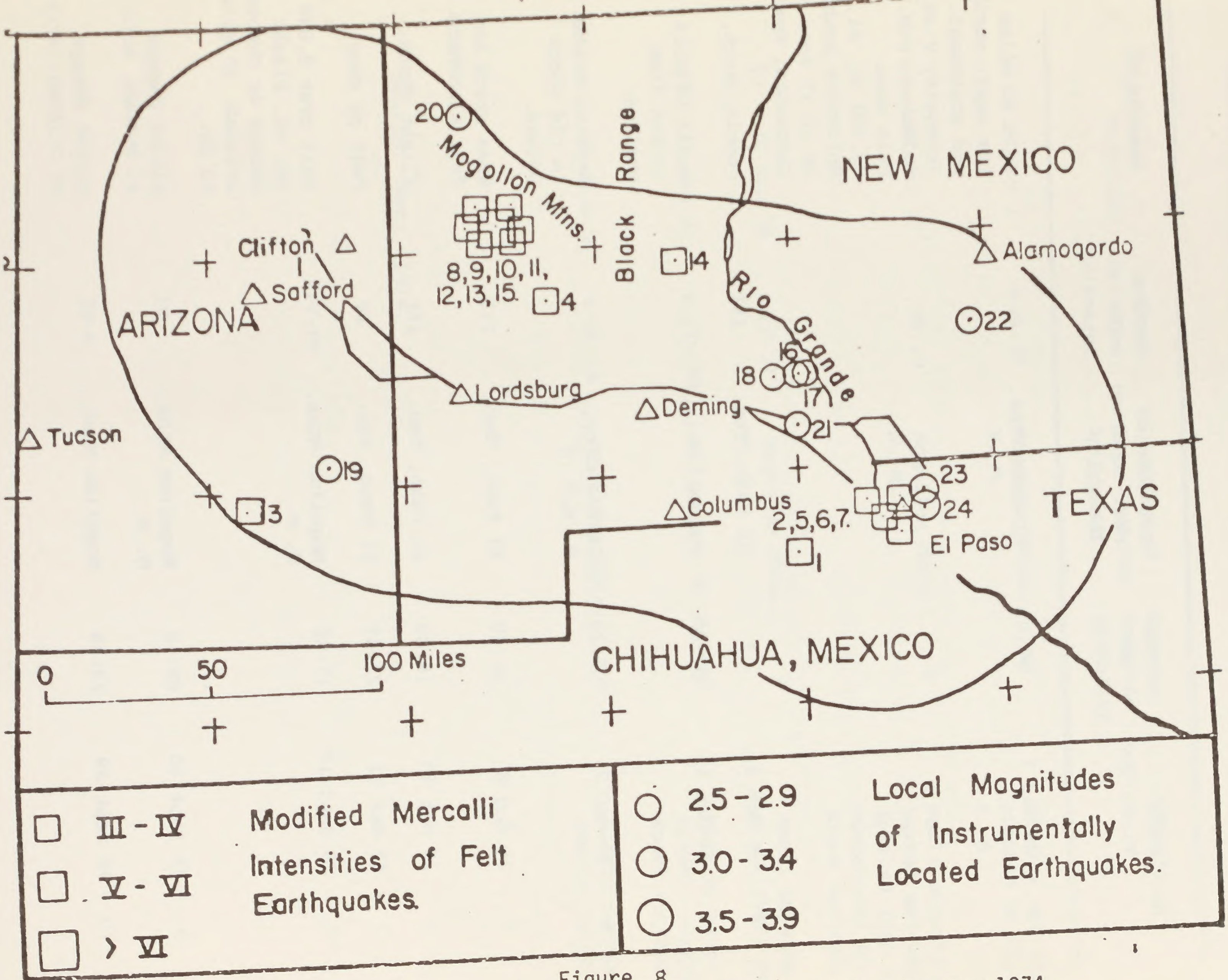


Figure 8
Reference: New Mexico Environmental Institute January 1974.

Table 6 Earthquakes Felt in the Region Prior to 1962.

No.	Date Yr/Mo/Day	Time GMT	Location of Max. Reported Intensity	Maximum Reported Intensity	Remarks
1	23 Mar 7	04:03	El Paso, Tex.	V	Felt 80 miles the west, nort and southeast. Intensity V at Columbus, N.M. Felt area 20,000 sq. mi. Epicenter prob SW of El Paso Chihuahua, Mex
2	31 Oct 2	?	El Paso, Tex.	III	Feeble shock.
3	34 Jan 11	07:00	Pearce, Ariz.	V	Small objects shaken from shelves.
4	34 May 7	05:22	Silver City, N. M.	V	Several cracks in old adobe houses.
5	36 Aug 8	01:40	El Paso, Tex.	III	Weak shock no felt elsewher
6	36 Oct 15	18:00	El Paso, Tex.	III	Slight shock.
7	37 Mar 31	22:45	El Paso, Tex.	IV	Felt by many.
8	38 Sept 17	17:20	Mogollon Mtns., N. M.	VI-VII	Felt over 8,0 sq. mi. Sligh damage at Dun Arizona. 35 m to SW.
9	38 Sept 20	05:40	Mogollon Mtns., N. M.	VI	Slight damage at Duncan, Ar
10	38 Sept 29	23:34	Mogollon Mtns.,	V-VI	Slight damage at Clifton, A

Table 6 Earthquakes Felt in the Region Prior to 1962 Continued.

No.	Date Yr/Mo/Day	Time GMT	Location of Max. Reported Intensity	Maximum Reported Intensity	Remarks
11	38 Nov 1	06:25	Mogollon Mtns., N. M.	VI	Plaster and chimneys cracked at Cliff, N. M.
12	38 Nov 27	00:13	Mogollon Mtns., N. M.	V	Small objects overturned and water spilled from indoor containers at Black Springs, N. M.
13	38 Dec 28	22:07	Mogollon Mtns., N. M.	V	Small objects moved at Clifton, Ariz.
14	39 Jan 31	17:10?	Hillsboro, N. M.	IV	Felt by many. Dishes, windows, doors rattled.
15	39 June 4	01:15	Mogollon Mtns., N. M.	V	Slight damage at Duncan, Ariz.

Source: NMEI, 1974

Table 7 Instrumentally Located Earthquakes in the Region from January, 1962 through June, 1971

No.	Yr/Mo/Day	Origin Time GMT	Location Lat ^{o}N	Long ^{o}W	Magnitude m_b	m_L
16	63 Feb 22	07:02:08.1	32.4	107.0		2.9
17	63 Feb 22	08:53:17.7	32.4	107.0		2.8
18	63 Aug 19	00:08:23.4	32.4	107.1		2.9
19	66 Sept 17	09:25:21	32.1	109.4		3.3
20	67 July 29	05:49:39	33.6	108.7		3.0
21	67 Sept 29	03:52:46	32.2	107.0		3.2
22	68 Mar 9	21:54:23.3	32.6	106.1		3.2
23	69 May 12	08:26:18.7	31.9	106.4	4.5	3.8
24	69 May 12	08:49:16.3	31.8	106.4	4.3	3.5

Reference: New Mexico Environmental Institute, January, 1974.

time scale, an earthquake of similar magnitude may occur in the Mogollon Mountains. However, due to the distance from previously recorded epicenters to the transmission line route, such a quake would probably not cause structural failure of the line.

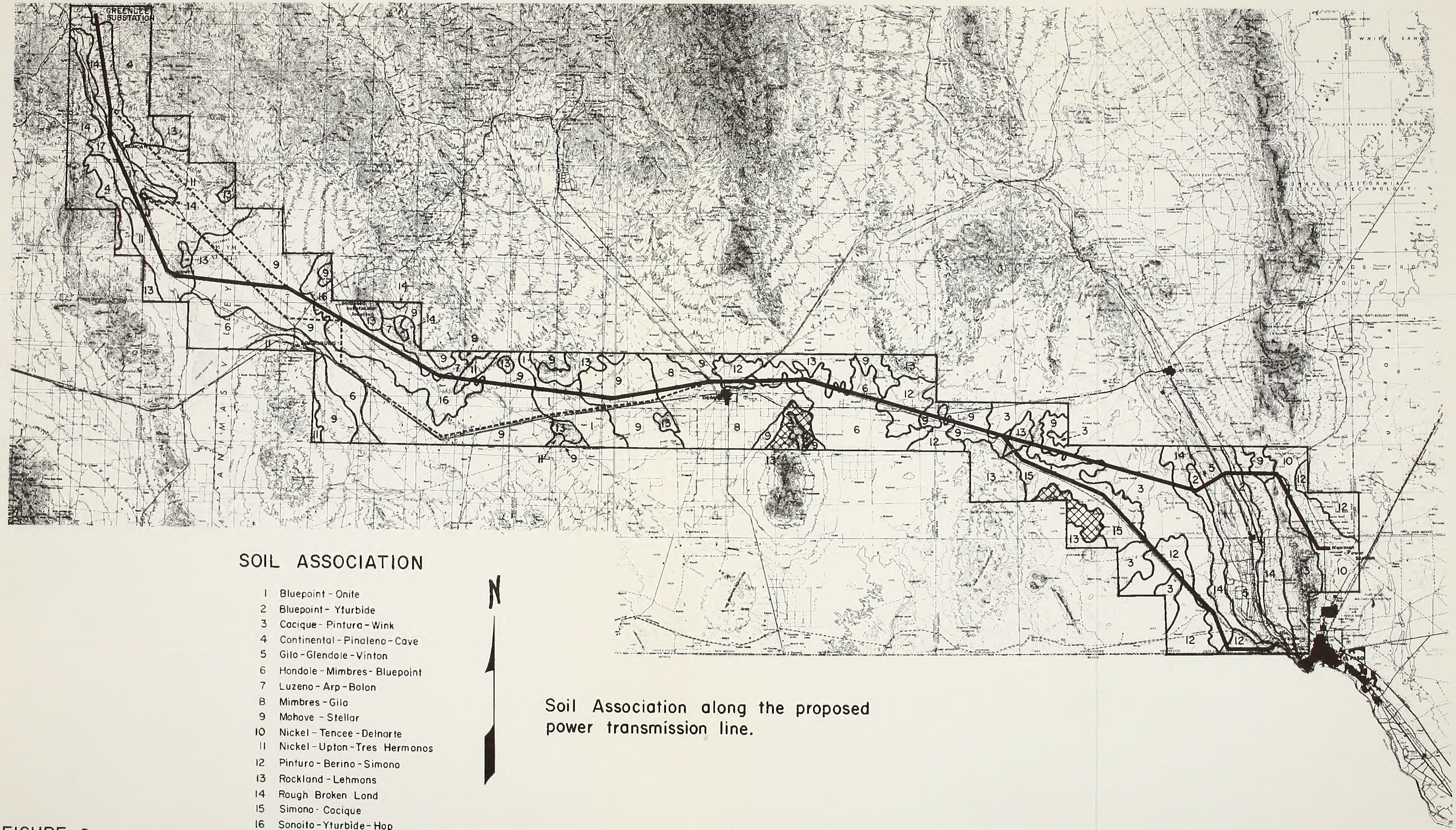
The only area where earthquakes have been centered on or near the proposed routes is in the Rio Grande and El Paso, Texas area. These earthquakes have all been mild (only 3.0 to 3.8 on the Richter Scale). This indicates that, although periodic mild shocks should be expected there in the future, the probability of a strong shock is limited. The magnitude of shocks previously experienced in this area would not cause damage to the power line structures.

4. Soils

a. Interpretation of the Soils Data Presented

Seventeen soil associations are diagrammed on the map presented in Figure 9. The general characteristics of each association, the soil occurring within each association, and the land forms upon which they occur are described in appendix A.

Table 8 summarizes the characteristics of each soil association which are considered important for analyzing the impacts of



SOIL ASSOCIATION

1 Bluepoint - Onite
2 Bluepoint - Yturbide
3 Cacique - Pintura - Wink
4 Continental - Pinaleno - Cave
5 Gila - Glendale - Vinton
6 Hondale - Mimbres - Bluepoint
7 Luzena - Arp - Bolon
8 Mimbres - Gila
9 Mohave - Stellar
10 Nickel - Tencee - Delnarte
11 Nickel - Upton - Tres Hermonos
12 Pinturo - Berino - Simona
13 Rockland - Lehmons
14 Rough Broken Land
15 Simona - Cacique
16 Sonoita - Yturbide - Hop
17 Verholen - Glendale - Mimbres - Comoro

Soil associations not affected by the line and not disscused in narrative.

N

Soil Association along the proposed power transmission line.

FIGURE 9
Scale: 1 in. = 12 miles (approx.)

TABLE 8

Soil Classification and Characteristics of Major Soils in Each Soil Association

Soil Asociation	USDA Texture	Slope (%)	Depth (Inches)	Substrate	Permeability	Erosion Hazard	Compaction Characteristic
1. Bluepoint-Onite							
Bluepoint Loamy Sand	Loamy sand	0-3	60+	Sandy Alluvium	Very Rapid	Low	Poor
Onite loamy sand	Loamy sand & Sandy loam	0-3	40-60	Sandy Alluvium	Rapid	Low	Poor
2. Bluepoint-Yturbide							
Bluepoint loamy sand	Loamy sand	1-5	60+	Sandy Alluvium	Very Rapid	Low	Poor
Yturbide loamy sand	Loamy sand & Gravelly loamy sand	1-5	60+	Sandy & Gravelly Alluvium	Very Rapid	Low	Poor
3. Cacique-Pintura-Wink							
Cacique laomy sand	Loamy sand & Sandy clay loam	0-3	20-40	Caliche	Moderate	Low	Good
Pintura fine sand	Fine sand	0-3	60+	Eolian Sand	Very Rapid	Low	Poor
Wink loamy sand	Loamy sand & soft caliche	0-3	24-36	Soft Caliche	Rapid	Low	Good
4. Continental-Pinaleono-Cave							
Continental gravelly sandy loam	Gravelly sandy loam & Gravelly clay loam	1-5	60+	Loamy Alluvium	Slow	Low	Good
Pinalene gravelly loam	Gravelly loam & Very gravelly loam	5-25	60+	Gravelly Alluvium	Moderate to Slow	Mod	Good
Cave gravelly sandy loam	Sandy loam & Gravelly loam	1-10	12-24	Caliche	Moderate	Low	Good

TABLE 8

Soil Classification and Characteristics of Major Soils in Each Soil Association

Soil Association	USDA Texture	Slope (%)	Depth (Inches)	Substrate	Permeability	Erosion Hazard	Compaction Characteristic
5. Gila-Glendale-Vinton							
Gila soils	Loam	0-1	60+	Loamy Alluvium	Moderate	Low	Good
Glendale soils	Clay loam & Sandy loam	0-1	60+	Loamy Alluvium	Slow to Very Slow	Low	Good
Vinton soils	Fine sandy loam & Loamy fine sand	0-1	60+	Sandy Alluvium	Rapid	Low	Poor
6. Hondale-Mimbres-Bluepoint							
Hondale silt loam	Loam, clay, silty clay loam & Sandy clay loam	0-1	60+	Loamy Alluvium	Very Slow	Low	Good
Mimbres silty clay loam	Silty clay loam & Sandy clay loam	0-1	60+	Loamy Alluvium	Slow	Low	Good
Bluepoint loamy sand	Loamy sand	0-3	60+	Sandy Alluvium	Very Rapid	Low	Poor
7. Luzena-Arc-Balon							
Luzena cobbly loam	Cobbly loam & Gravelly clay	10-30	6-20	Acid Igneous Bedrock	Slow	Mod	Good
Arp gravelly loam	Gravelly loam & Gravelly clay loam	10-30	20-40	Acid Igneous Bedrock	Slow	Mod	Good
Balon gravelly loam	Gravelly loam	5-25	60+	Gravelly Alluvium	Moderate	Low	Good
8. Mimbres-Gila							
Mimbres silty clay loam	Silty clay loam & Sandy clay loam	0-1	60+	Loamy Alluvium	Slow	Low	Good
Gila soils	Loam	0-1	60+	Loamy Alluvium	Moderate	Low	Good

Soil Classification and Characteristics of Major Soils in Each Soil Association

Soil Association	USDA Texture	Slope (%)	Depth (Inches)	Substrate	Permeability	Erosion Hazard	Compaction Characteristic
9. Mohave-Stellar-Berino							
Mohave sandy clay loam	Sandy clay loam & clay loam	0-3	60+	Calcareous Alluvium	Slow	Low	Good
Stellar clay loam	Clay loam & Clay	0-3	60+	Calcareous Alluvium	Slow	Low	Good
Berino loamy sand	Loamy sand & Sandy clay loam	[illegible]	60+	Calcareous Alluvium	Moderate	Low	Good
10. Nickel-Tencee-Delnorte							
Nickel gravelly sandy loam	Gravelly sandy loam Very gravelly loam	0-10	15-25	Caliche	Rapid	Low	Poor
Tencee very gravelly loam	Very gravelly loam	0-10	6-20	Caliche	Rapid	Low	Poor
Delnorte very gravelly loam	Very gravelly loam	0-10	6-20	Caliche	Rapid	Low	Poor
11. Nickel-Upton-Tres Hermanos							
Nickel gravelly loam	Gravelly sandy loam Very gravelly sandy loam	1-9	15-25	Caliche	Rapid	Low	Poor
Upton gravelly loam	Gravelly loam	1-9	6-20	Caliche	Moderate	Low	Poor
Tres Hermanos gravelly clay loam	Gravelly clay loam Very gravelly loam	0-5	24-36	Gravelly caliche	Moderate	Low	Poor

TABLE 8

Soil Classification and Characteristics of Major Soils in Each Soil Association

Soil Asociation		USDA Texture	Slope (%)	Depth (Inches)	Substrate	Permeability	Erosion Hazard	Compaction Characteristic
12.	Pintura-Berino-Simona							
	Pintura fine sand	Fine sand	0-3	60+	Eolian Sand	Very Rapid	Low	Poor
	Berino loamy snad	Loamy sand & Sandy clay loam	0-3	60+	Calcareous Alluvium	Moderate	Low	Good
	Simona sandy loam	Loamy sand	0-3	6-20	Caliche	Rapid	Low	Poor
13.	Rockland-Lehmans							
	Rockland		15-75				Mod	
	Lehmans rocky loam	Stony loam & Stony clay	10-25	10-20	Acid Igneous Bedrock	Very Slow	Mod	Good
14.	Rough Broken Land							
	Rough Broken Land		15-50				Mod	
	Bluepoint loamy sand	Loamy sand	1-10	60+	Sand Alluvium	Very Rapid	Low	Poor
	Caliza very gravelly sandy loam	Very gravelly sandy loam & Very gravelly sand	1-5	10-20	Gravelly Alluvium	Rapid	Mod	Poor
	Yturbide gravelly loam sand	Gravelly loam sand	1-10	60+	Sandy & Gravelly Alluvium	Very Rapid	Low	Poor
15.	Simona-Cacique-Tonuco							
	Simona fine sandy loam	Fine sandy loam	0-3	6-12	Caliche	Rapid	Low	Poor
	Cacique sandy loam	Sandy loam & Sandy clay loam	0-3	20-40	Caliche	Moderate	Low	Good
	Tonuco Loamy sand	Loamy sand	0-3	10-20	Caliche	Rapid	Low	Poor

TABLE 8

Soil Classification and Characteristics of Major Soils in Each Soil Association

Soil Asociation	USDA Texture	Slope (%)	Depth (Inches)	Substrate	Permeability	Erosion Hazard	Compaction Characteristic
16. Sonoita-Yturbide-Hap							
Sonoita gravelly sandy loam	Gravelly sandy loam & Gravelly sandy clay loam	0-5	60+	Gravelly Sandy Loam	Moderate	Low	Good
Yturbide loamy sand	Loamy sand & Gravelly sand	0-3	60+	Gravelly Loam	Very Rapid	Low	Poor
Hap gravelly loam	Gravelly sandy clay loam & Sandy clay loam	1-9	20-50	Soft Caliche	Moderate	Low	Good
17. Verhalen-Glendale-Mimbres-Comoro							
Verhalen silty clay loam	Silty clay loam, clay, & Clay loam	0-1	60+	Loamy Alluvium	Very Slow	Low	Good
Glendale silty clay loam	Silty clay loam	0-3	60+	Loamy Alluvium	Slow	Low	Good
Mimbres silty clay loam	Silty clay loam & Sandy clay loam	0-1	60+	Loamy Alluvium	Slow	Low	Good
Comoro fine sandy loam	Sandy loam & Sand	0-3	60+	Alluvium	Rapid	Low	Poor

The following interpretations apply to Table 8:

Compaction Characteristic	Interpretation
Poor	The soil may be compacted if traversed by heavy equipment when moist.
Good	The soil should not be seriously compacted if traversed by heavy equipment, even when moist.

the proposed transmission lines upon the soil resources. These characteristics include: USDA texture, slope, depth, substrata, permeability, erosion hazard, and compaction characteristics. With the exception of compaction characteristics, the data in the table were taken from the following soils reports: Dona Ana County (Maker, et al, 1971), Luna County (Maker, et al, 1970), Grant County (Maker, et al, 1971), and Hidalgo County (Maker, et al, 1970)--all in New Mexico--and Greenlee County, Arizona (Richmond, 1972).

Compaction characteristics are normally based on the relative ease with which the desired soil density can be achieved. This is accomplished by controlling moisture and lift depth, followed by a reasonable number of passes with compaction equipment. Ordinarily, a rating of "good" would mean a soil is relatively easy to compact. However, this rating system was found misleading for purposes of identifying impacts related to the proposed power lines, since the goal in this case is to avoid compaction rather than cause it. Therefore, the compaction ratings in Table 8 have been reversed from their customary meanings in order to depict more clearly the expected impacts upon the soil resource.

5. Hydrology

a. Ground Water

The deep, alluvium filled valleys along the proposed route contain extensive ground water reservoirs which provide water for agricultural and urban needs in the various communities of southwestern New Mexico and southeastern Arizona. As the proposed power lines may help accommodate population growth in those areas, the subject of ground water will be addressed as a possible resource to be indirectly impacted. There are four water basins along the routes; these are the Mesilla Valley, Deming or Mimbres Basin, Lordsburg Basin, and the Virden Valley.

The Rio Grande supplies most of the recharge in the Mesilla Valley Basin with only minor recharge coming from local runoff. Depth to the water table averages 6 to 12 feet on the valley floor. Although irrigation water is primarily supplied by surface water, some ground water is also used. The water table remains relatively stable. Las Cruces, New Mexico, located in the Mesilla Valley some 45 miles north of El Paso, is the largest city dependent upon this water basin. The Mesilla Valley Basin has remained relatively stable and is believed capable of supporting substantial population expansion throughout this area.

The Deming area receives its water from two water basins which are believed to be interconnected. The Deming Basin, located west of the Florida Mountains, is recharged by local ephemeral

watershed. The Mimbres Basin, located east of the Florida Mountains, is recharged primarily by the Mimbres River which sinks into the basin; however, some recharge does come from local runoff. The interconnection between these basins is believed to result in spillage from the Deming Basin into the Mimbres Basin. When the area was first opened to irrigation, the water table was within 20 to 30 feet of the surface in certain areas. At present, large volumes of water are being pumped from depths of 140 feet for irrigation and 250 to 500 feet for community use. As a result, the water table has steadily declined. During a 5-year period, from 1961 to 1966, the water table declined 35 feet, (Dinwiddie, et al, 1966).

Lordsburg also has a declining water table. The Lordsburg Basin is a closed basin with no permanent streams on the surface. In 1971, the water table was 100 to 140 feet below the ground (Hudson, 1971). Municipal water comes from public wells 250 feet or more deep.

In the Virden Valley, most of the agricultural water is transported by canal from the Gila River, which also supplies the ground water. The water table is 10 to 30 feet below the surface and is stable. Drinking and utility water comes from private wells 50 to 100 feet deep.

b. Surface Water

With the exception of the Rio Grande and the Gila River, the general watershed along the proposed routes occurs

through interior drainage. That is, ephemeral runoff is channelized by small arroyos along the hill sides and piedmont areas and spreads out into sheet flow as it reaches the valleys. There it sinks into valley gravels and sands or runs into playas to evaporate later.

The surface water is generally very high in suspended and collidal particles. The Rio Grande and Gila River also have concentrations of dissolved salts and organic matter. Surface water is not used for human consumption in the area.

6. Land Use

a. Land Ownership

North of the Texas-New Mexico state line, the prime route for the first line from El Paso immediately enters National Resource Lands (NRL) administered by the Bureau of Land Management. The route crosses public land for 7 miles before entering the Ft. Bliss Military Reservation. Approximately 5 miles of military land are crossed before the route emerges onto and crosses another 3 miles of public land located east of the Rio Grande.

The Rio Grande Valley crossing is entirely private land with the exception of a ½-mile-wide area of land withdrawn by the Federal Power Commission for power site considerations.

West of the Rio Grande Valley, the first 28 miles crossed by the first line are almost entirely Federal land with occasional State sections and small private tracts scattered throughout. This large area of public land extends south to the Mexican border and would also be crossed by the route for the second line.

From the intersect point of the two lines westward to Deming, the route passes over a checkerboard ownership pattern comprised mostly of State and private lands with small, isolated tracts of Federal lands interspersed. The land within 3 to 5 miles of Deming is privately owned.

Between Deming and Lordsburg two large well-blocked areas of State land are crossed. Checkerboard patterns of State, private, and NRL lie on each side of these blocks of State lands, as well as between them. The lands within 5 miles to the north and northwest of Lordsburg are State and private.

Approximately 7 miles west of Lordsburg, the prime and alternate routes again enter a large area of mostly NRL east of the New Mexico-Arizona state line. In this area, however, the Virden alternate would cross private lands in the Virden Valley and also a portion of lands withdrawn along the Gila River for the San Carlos Irrigation Project.

From the state line to Duncan, Arizona, the prime and alternate routes cross a checkerboard pattern of State, private, and NRL. The corridor from Duncan to the Greenlee substation crosses primarily NRL and State land. (Tables 9 and 10 summarize the land status along the prime and alternate routes.)

b. Major Land Uses Along the Routes

Although the proposed routes follow existing utility and transportation corridors for the most part, a decision was made against showing these as major land uses so as to give

Table 9 Land Status Along the Prime Route

A. The Prime Route for the First Line

BLM administered land	80.0 miles
Private land	52.0 miles
State land	68.0 miles
Military land (Ft. Bliss)	5.0 miles
Total	205.0 miles

B. The Prime Route for the Second Line (from the Rio Grande substation to the intersect point with the first line)

BLM administered land	30.5 miles
Private land	10.0 miles
State land	6.1 miles
Total	46.6 miles

Note: Mileages shown are close approximations.

Table 10 Land Status Along the Alternate Routes

A. Interstate 10 Alternate (from the intersect point with Interstate 10 to the Lordsburg substation)

BLM administered land	13.8 miles
Private land	21.6 miles
State land	13.0 miles
Total	48.4 miles

B. Virden Alternate (from the Lordsburg substation to the intersect point with the prime route)

BLM administered land	22.4 miles
Private land	9.8 miles
State land	9.8 miles
Total	42.0 miles

C. U. S. 70 Alternate (from the Lordsburg substation to the intersect point with the prime route)

BLM administered land	13.3 miles
Private land	6.8 miles
State land	15.0 miles
Total	35.1 miles

Note: Mileages shown are close approximations.

adequate attention to the areas' more extensive uses such as livestock production, crop production, residential use, and military use. Figure 10 shows the most common of these uses as they presently occur along the prime and alternate routes. It also divides the routes into segments of similar land usage to facilitate the following discussion.

In segment B-1, the land use in the Rio Grande Valley is primarily residential with scattered crop production. Immediately west of the valley, the route would pass through lands being proposed for the Anapra Port of Entry, in New Mexico. This development is proposed under the Twin Plant and Border Industrialization Program between the United States and Mexico. Although a detailed plan of development was not available for study, it is assumed that some sort of industrial development would take place in the immediate vicinity. Just to the north, a large residential community named Santa Teresa is being developed (Figure 11). The land along the remaining portion of this segment is used primarily for grazing, although there is increasing recreational use by people living in El Paso and the smaller communities in the valley north of El Paso.

The lands along segment B-2 share an increasing recreation demand for residents of the El Paso and Las Cruces areas. The primary use, nevertheless, remains livestock grazing. Most of the rangeland is marginal with yearlong grazing capacities ranging from 3 to 5 cows per section of land. Mining activity is also

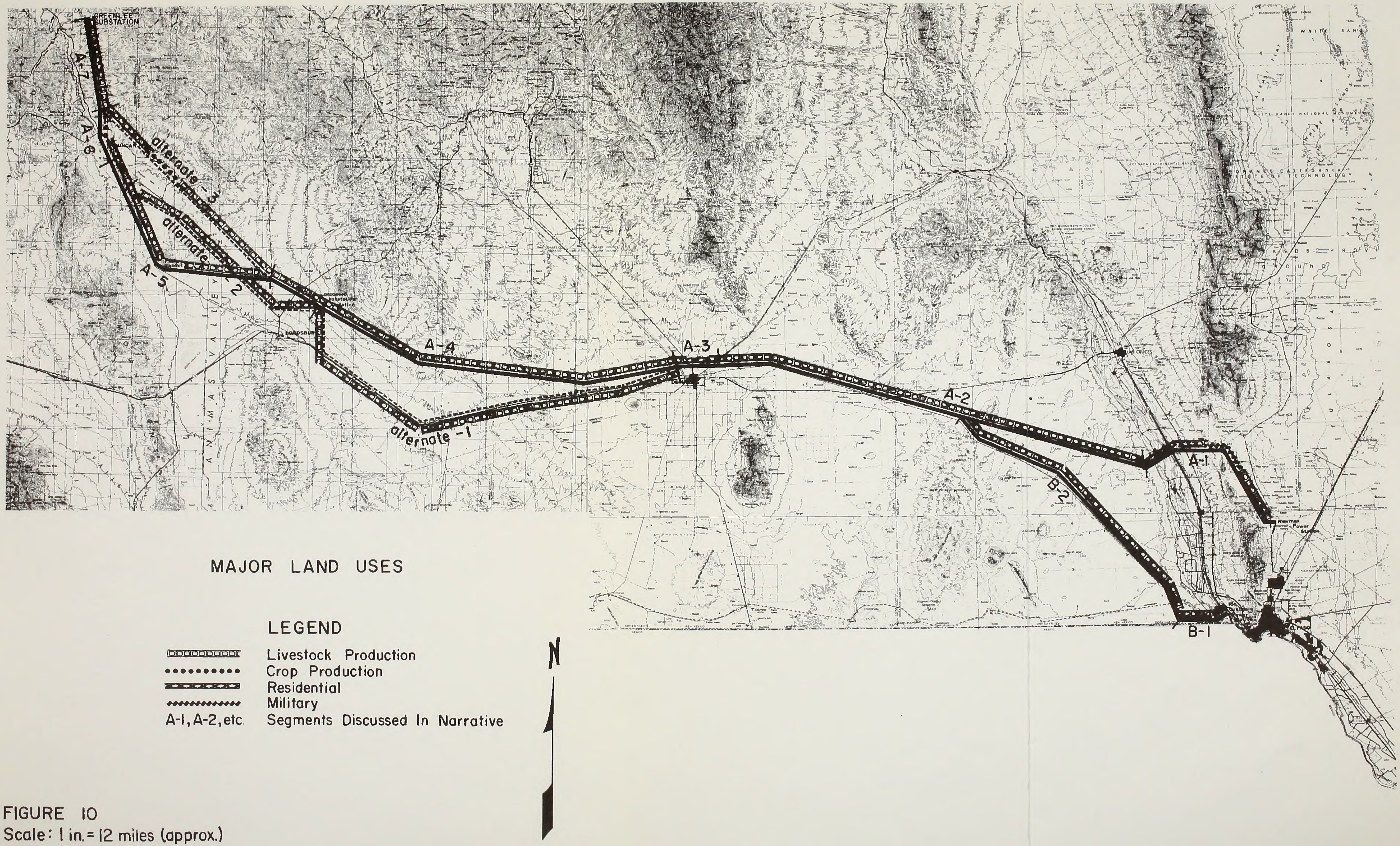


FIGURE 10
Scale: 1 in. = 12 miles (approx.)

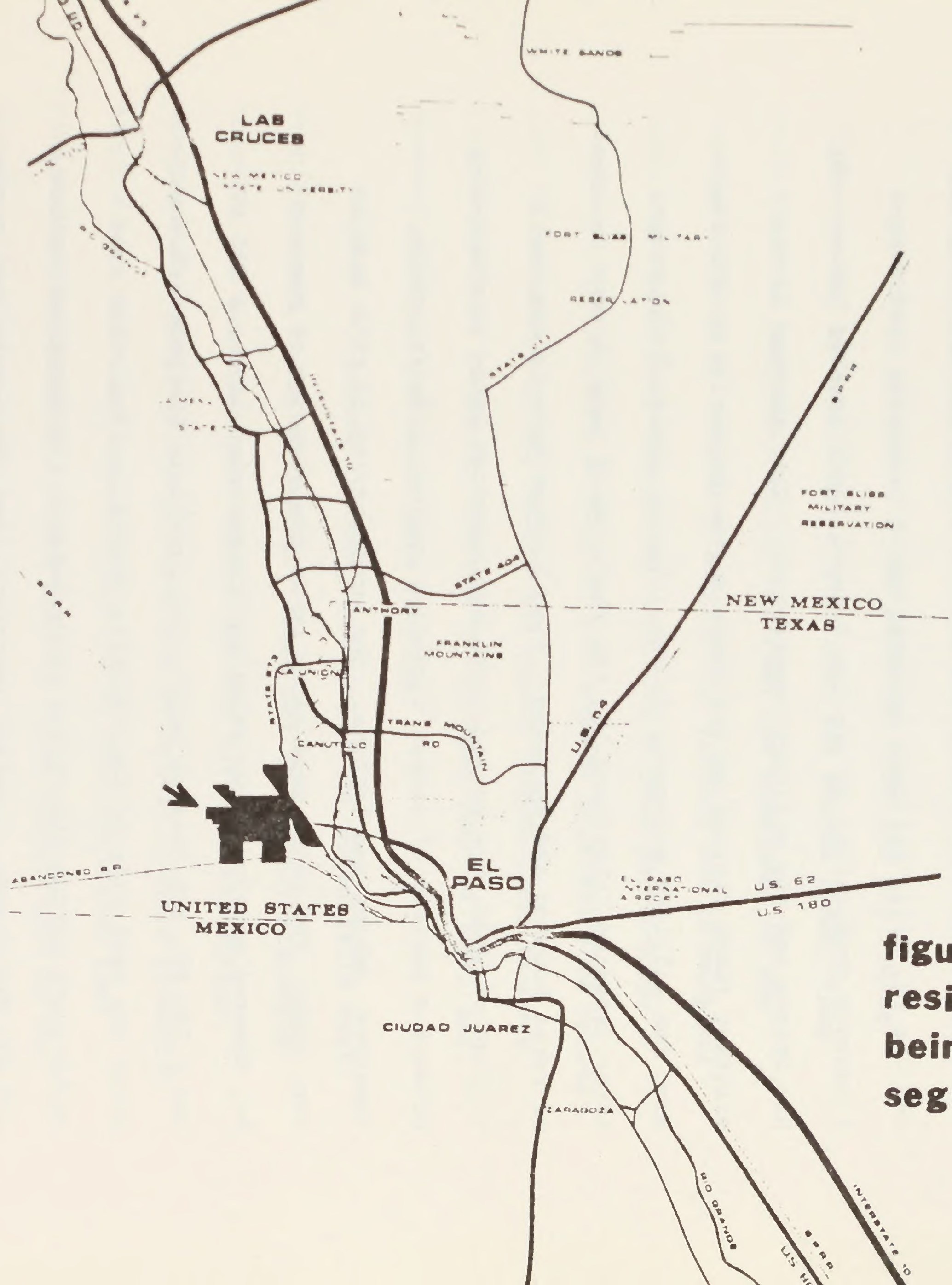


figure 11, Santa Teresa residential community being developed in segment B1

present in this segment. Scoria and lava stone are extracted from one of the numerous cinder cones found in the area. This material is used primarily for landscaping purposes and building block. The segment also serves as a utility corridor for telephone lines and the Southern Pacific Railroad.

Segment A-1 has the most diversified land usage of any of the route segments. The land lying between the Newman Power Station and the Ft. Bliss Military Reservation is primarily used for livestock production, as are the Federal lands located between the Rio Grande and the military reservation. That portion of the military range crossed by the route serves primarily as a buffer zone for military maneuvers in the interior areas of the range. After crossing Interstate 10, the route would pass through an area of rural housing and farmland. Also located here is the small village of Vado, New Mexico. The agricultural lands in the valley produce a variety of crops, including cotton, alfalfa, chile, tomatoes, pecans and lettuce. The productivity of this land is very high. Two other uses along or in the vicinity of segment A-1 deserve mention. Two existing transmission lines, a 345 KV and a 230 KV, are located here. One parallels the proposed route along the east side of the Franklin Mountains; the other runs north-south across the valley slope between the Franklin Mountains and the Rio Grande. Another important land use occurs just north of the proposed route in the Organ Mountains. A large area of Federal land within the Organ Mountains has been designated as

recreational lands by the Bureau of Land Management. A proposed protective withdrawal has been submitted by the BLM which would cover the public lands within the Organ Mountains. The withdrawal would also include Bishop's Cap, a small mountain located immediately south of the Organs. As proposed, the transmission line would pass immediately below the southern border of this proposed protective withdrawal area.

Segment A-2 parallels a gas pipeline from the Rio Grande Valley to the intersection of the first and second lines, then parallels the Southern Pacific Railroad the remainder of the segment. The area is used primarily for grazing but is marginal rangeland capable of supporting only 3 to 8 cows per section yearlong. The eastern portion of the segment provides some recreation to residents of Las Cruces and nearby communities; however, recreation here is mostly limited to Off-Road Vehicle (ORV) use, weekend outings, and small game hunting.

Segment A-3 passes through residential, or potentially residential, areas north of Deming. Homes are now widely scattered; however, the area has been subdivided for further residential development. North of town, homes are presently located primarily along U. S. 180. The report submitted by NMEI indicates that residential development in this area is being discouraged by the occasional foul odor emissions generated by a smelter located in the vicinity.

Segment A-4, from Deming to State Highway 90 north of Lordsburg, passes through rangeland of higher carrying capacity than that found to the east. The primary use of this area is livestock production. The route parallels the gas pipeline right-of-way over most of the segment.

Livestock production continues to be the highest land use on the prime route along segment A-5. In this area, however, the route leaves the pipeline right-of-way, crosses over the Southern Pacific Railroad right-of-way and parallels it to Duncan, Arizona. Recreation use is significant along this segment, particularly in the area between Summit and Duncan. The public lands south of the railroad are becoming increasingly important as recreational lands. The primary access to this area is from U. S. 70 along a dirt road which crosses the railroad and continues southward along the east side of the Peloncillo Mountains. This area offers rockhounding, hiking, hunting, and unspoiled scenic value to the recreationist.

Segment A-6 includes the proposed routing immediately south of Duncan, Arizona and also the crossing point on the Gila River. The lands south of Duncan are used primarily for grazing. However, the town has advised the BLM that the town may possibly be moved southward out of the Gila River floodplain. Town officials also expressed concern that a new transmission line might adversely affect the landing approach to a small airstrip located 1½ miles southwest of Duncan's present site. These factors were taken into

consideration, along with a possible routing suggested by the town of Duncan, in determining the proposed transmission line route (Figure 12). The crossing site on the Gila River is considered a utility corridor. A gas pipeline already crosses the river valley at the location proposed for the transmission lines. Land use in the valley is agricultural and rural residential.

The primary land use in segment A-7 is livestock grazing. Recently, a gas pipeline was installed which roughly parallels the proposed route for approximately 5 miles north of the Gila River.

Although the major land use along the Interstate 10 Alternate (Alternate 1 in Figure 10) is livestock grazing, this route should be classified as a transportation and utility corridor. Interstate 10 is paralleled on the north by the Southern Pacific Railroad throughout the length of this alternate. Several overhead lines parallel the railroad, including two telephone lines which are joined by a small power line in the western part of the segment. These utilities present an extremely cluttered scene, particularly to the north of the highway and directly ahead of the traveler. Two developed rest stops are located a few miles east of the Separ interchange. These rest stops were built by the New Mexico State Highway Department and provide picnic facilities, restrooms, and overnight camping to travelers.

The U. S. 70 alternate (Alternate 2 in Figure 10) west of Lordsburg follows a gas pipeline right-of-way after leaving the highway. The principal land use in addition to the pipeline is livestock production.

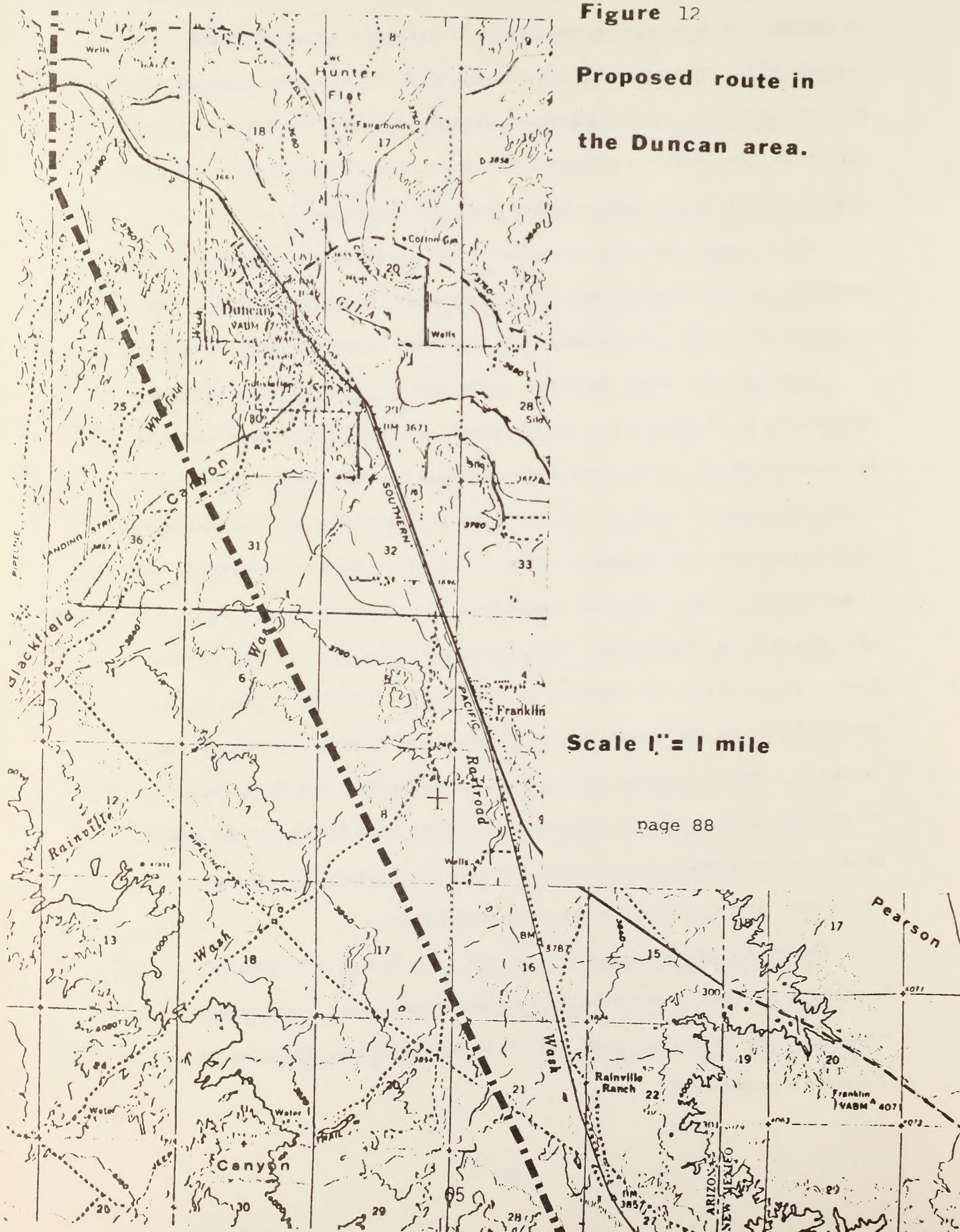


Figure 12

Proposed route in the Duncan area.

Scale 1" = 1 mile

The Virden alternate (Alternate 3 in Figure 10) involves several other land uses in addition to grazing. As mentioned earlier, the direct route as shown would cross certain lands along the Gila River which were withdrawn for watershed protection in conjunction with the San Carlos Irrigation Project. This part of the river was recently under consideration for classification as a wild river under the Wild and Scenic River Act of 1968. Scenic and recreational values of this and surrounding areas will be discussed in following sections. The Virden Valley contains productive cropland which produces primarily cotton, corn, and alfalfa. The route would pass near Virden itself as well as scattered rural homes in the valley.

B. <u>Living Components</u>

1. <u>Flora</u>

An analysis was made of possible impacts from the power line project upon the total vegetative community. This analysis resulted in a breakdown of the problem into the following specific questions which were deemed of significance to this particular proposal:

(a) Are there any unique or otherwise significant wildlife habitats along the routes?

(b) Which vegetative types will require clearing to allow access by construction vehicles?

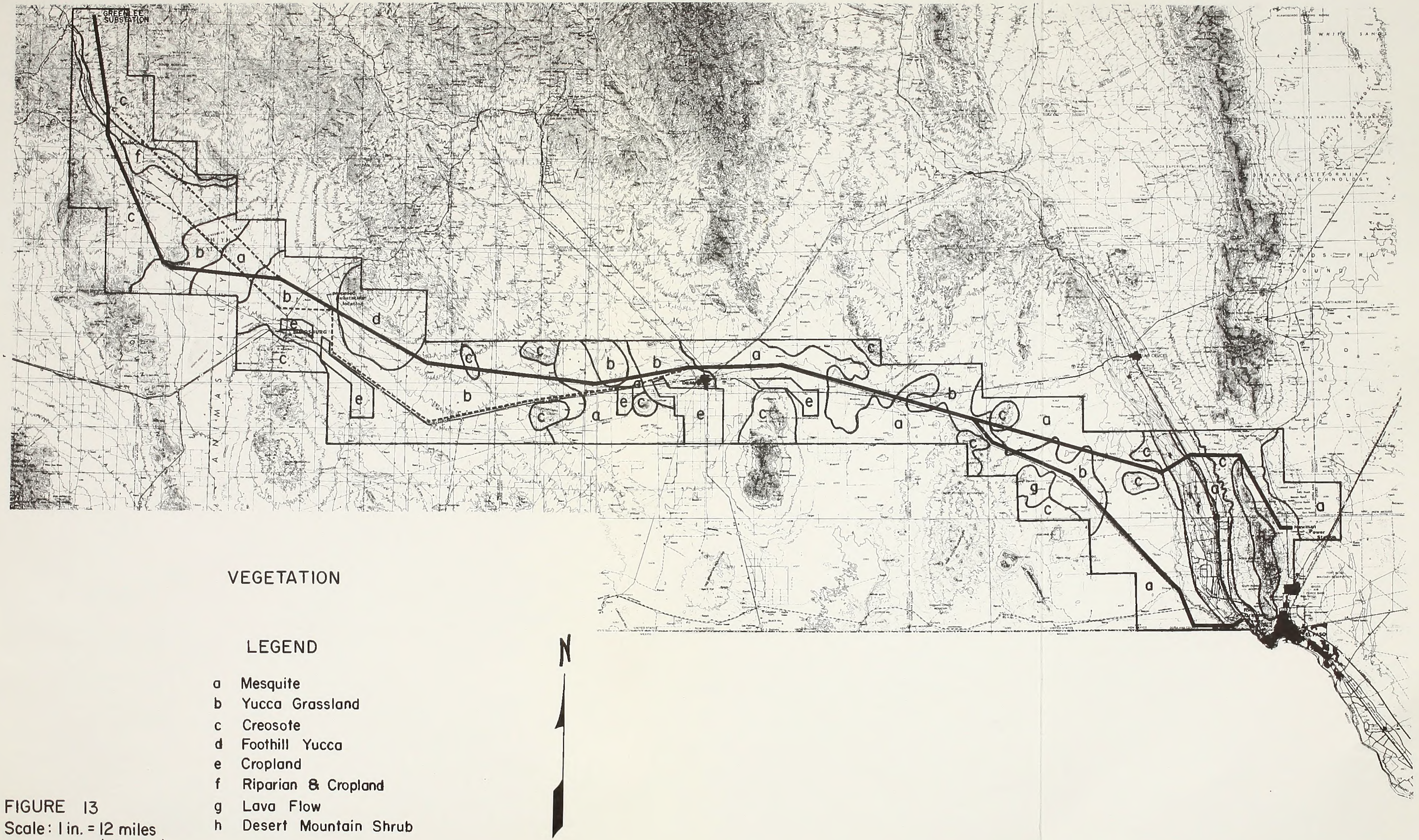
(c) How important to watershed protection are the various vegetative types found along the routes?

(d) How important are the various vegetative types toward enhancing scenic values?

(e) Will areas which support plant species valuable for landscaping and collecting become more accessible due to the construction of the power lines?

(f) Are there any rare or unique vegetative species or communities located along the proposed routes?

The various plant communities along the routes can be broadly categorized into six vegetative types; (1) mesquite (2) yucca grassland, (3) creosote, (4) foothill yucca, (5) cropland, and (6) riparian. Figure 13 shows the locations of these types along the various routes. Two types shown on the map--lava and other desert



VEGETATION

LEGEND

a Mesquite
b Yucca Grassland
c Creosote
d Foothill Yucca
e Cropland
f Riparian & Cropland
g Lava Flow
h Desert Mountain Shrub

FIGURE 13
Scale: 1 in. = 12 miles
(approx.)

shrub--will not be described below, because they would not be influenced by the power lines.

Mesquite

The mesquite (Prosopis juliflora) type is normally found on the sandier soils associated with level to gently sloping terrain. A range is found from areas almost totally dominated by mesquite (i.e. mesquite dunes) to areas supporting a variety of herbaceous and/or woody species in association with mesquite (e.g. mesquite-creosote, mesquite four-winged saltbush, mesquite grassland, etc.).

Mesquite duned areas can be found intermittently along all of the routes but are particularly prevalent near Deming and along the first few miles west of the Rio Grande Valley. In such areas, very little other vegetation is supported among the mesquite plants.

The mesquite-creosote association is mostly limited to the east edge of the Rio Grande Valley, where it occurs along the lower reaches of the major drainages. This type of growth is difficult for vehicles to penetrate.

The remaining mesquite dominated plant communities vary from mostly grassland types with widely scattered mesquite clumps to relatively dense stands of mesquite mixed with various grasses and woody species. Commonly associated species include: tobosa grass (Hilaria mutica), sand dropseed (Sporobolus cryptandrus), mesa dropseed (S. flexuosus), sand sagebrush (Artemisia filifolia),

four winged saltbush (Atriplex canescens), indigo bush (Dalea scoparia), mormon tea (Ephedra trifurca), broom snakeweed (Gutierrezia sarothrae), and soaptree yucca (Yucca elata).

Yucca-grassland

This type is mostly found on level mesas and is composed primarily of dropseed (Sporobolus) and grama (Bouteloua) grasses with varying densities of soaptree yucca. Species commonly associated with this type include: black grama (Bouteloua eriopoda), blue grama (B. gracilis), tobosa grass, sand dropseed, mesa dropseed, mormon tea, winterfat (Eurotia lanata), broom snakeweed, creosote bush (Larrea tridentata), soaptree yucca, and mesquite. Broad tobosa grass swales are extremely common in this type, becoming most prevalent in the lower elevations where drainages fan out onto the flood plains. In general, this type enhances the scenic value of the landscape wherever it occurs.

Creosote

Although creosote is encountered throughout the area, it occurs predominantly on the dry gravelly soils and steeper slopes along the extreme east and west ends of the proposed routes. In general, few other plant species occur in association with creosote dominated plant communities. This is particularly true east of the Rio Grande Valley, where vast stands of creosote are so competitive that almost no grass and few other woody species can be found in their vicinities. Creosote has been somewhat less competitive along the western part of the route. Near Summit, for

example, a fairly good grass cover grows between creosote plants. The stretch between Duncan, Arizona and the Greenlee substation supports a good variety of both herbaceous and woody species.

Several species found in association with creosote are subject to collecting. These include ocotillo (Fouquieria splendens), banana yucca (Yucca baccata), Torrey's yucca (Yucca torreyi), and several species of cactus, including hedgehog cactus (Echinocereus) and barrel cactus (Ferocactus Wislizeni).

Foothill Yucca

This type occurs only on the Burro Mountain piedmont northeast of Lordsburg. The terrain is characterized by numerous parallel drainages with gently sloping ridges between. The vegetation is composed primarily of mesquite, skunkbush (Rhus trilobata), little leaf sumac (Rhus microphylla), and various yuccas. Hoary yucca (Yucca shottii), a particularly attractive species, reportedly occurs (N. M. E. I. 1974). This plant's range is limited to extreme southwestern New Mexico. Other associated species include beargrass (Nolina microcarpa), various cacti, mormon tea, black grama, and sideoates grama (Bouteloua curtipendula).

The drainages are densely vegetated with skunkbush, little leaf sumac, netleaf hackberry (Celtis reticulata), Texas mulberry (Morus microphylla), mesquite, graythorn (Condalia sp.), burro brush (Hymenoclea sp.) and others.

Cropland

See land uses, Part II, A. 6. b., p. 76

Riparian

This type encompasses the vegetation adjacent to the Gila River and Rio Grande at the proposed crossing points. The surrounding lands are under cultivation; consequently, man's activities have disturbed the relatively stable riparian vegetative condition which once existed there.

At the Rio Grande crossing, cottonwood (Populus fremontii) parkland occurs. The cottonwoods are widely scattered, with relatively dense stands of bermuda grass (Cynodon dactylon) and alkali sacaton (Sporobolus airoides) occupying the spaces between. Salt cedar (Tamarix sp.), seepwillow (Baccharis glutinosa), and true willow (Salix sp.) also occur in varying densities along the river.

The Gila River provides more valuable wildlife habitat than the Rio Grande because of the greater diversity of plant species occurring there. Cottonwood and Arizona sycamore (Platanus wrightii) are the tallest tree species, with velvet ash (Fraxinus velutina), netleaf hackberry, and boxelder (Acer negundo), all medium sized trees, growing among them. Below these species, catclaw (Acacia greggii), mesquite, seep-willow and burro brush provide a third layer of vegetation.

In addition to the river crossings, virtually all arroyos along the proposed routes provide a "semi-riparian" vegetative type which is also important to wildlife. Larger brush and tree species are found in these arroyos, including Apache plume (Fallugia

paradoxa), little leaf sumac, skunkbush and netleaf hackberry. The drainage vegetation associated with the Foothill Yucca affords the most valuable "semi-riparian" conditions to be found in the study area.

Endangered and Threatened Plant Species and Rare Plant Communities

Although a proposed list of Endangered and Threatened Plant Species 1/ was recently published in the Federal Register (July 1, 1975), no information has been made available regarding their range, habitat preferences, and other matters of ecological significance necessary to locate these species and reach conclusions regarding the nature of their demise. As provided under section IV-e, further investigations will be conducted prior to actual construction.

With the exception of the riparian habitat previously described for the Gila River, none of the plant communities crossed by the various routes is considered to be rare or uncommon to New Mexico, Arizona, or the Southwest in general.

2. Fauna

The most important wildlife habitat found in the vicinity of the routes occurs along the Gila River. More specifically, this area is east of the Virden Valley, running from Canador Peak east along the Gila River for some 6 miles.

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1. Prepared in accordance with Section 12 of the Endangered Species Act of 1973.

The availability of perennial water riparian vegetation and steep cliffs supports a diversity of mammals, birds, reptiles, amphibians, and fish which are classified as endangered or threatened, or which are highly uncommon in occurrence in the southwestern United States. This particular combination of habitat components is extremely uncommon in the Southwest and is considered biologically and ecologically important where found. Geographically, the Gila River is situated to attract a number of species from Mexico and Arizona, as well as certain species commonly associated with the more northern latitudes of North America. It has been reported that the Gila River in New Mexico supports the most diverse avifauna of any river in the Lower Colorado River Drainage, including the largest number of Endangered and Threatened species. Table 11 provides a list of all animal species known or suspected to occur in this area which have been classified under the Endangered Species Act of 1973 and the state of New Mexico Wildlife Conservation Act of 1973.

Of particular importance are the raptors. Of the 6 birds of prey shown in Table 11, 3 are definitely known to occur and possibly nest in this area. A pair of peregrine falcons were found nesting here in 1973. Several prairie falcons, once classified as a threatened species, have nested for a number of years on a small hill immediately south of the Gila River across from Canador Peak. There is evidence that the species listed as potentially occurring along the Gila River were historical residents of the area.

Table 11 Endangered and Threatened Species of the Gila River

Key to Occurrence

* - Known to occur
** - Hypothetical occurrence (not confirmed)
F - Federal list
S - State list

A. Mammals

None

B. Birds

Mexican duck (Anas diazi)* (F,S)
Mississippi Kite (Ictinia misisippiensis)* (S)
Bald eagle (Haliaeetus leucocephalus)** (F,S)
Osprey (Pandion haliaetus)** (S)
Peregrine falcon (Falco peregrinus anatum)* (F,S)
Aplomado falcon (Falco femoralis septentrionalis)** (S)
Northern black hawk (Buteogallus anthracinus anthracinus)* (S)
Gila woodpecker (Centurus uropygialis)** (S)

C. Reptiles

Narrow headed garter snake (Thamnophis rufipunctatus)* (S)
Gila monster (Heloderma suspectum)* (S)
Arizona coral (Micruroides euryxanthus)* (S)

D. Fish

Gila spikedace (Meda fulgida)* (S)
Loach minnow (Tiaroga cobitis)** (S)
Gila topminnow (Poeciliopsis occidentalis)** (S)
Roundtail chub (Gila robusta)** (S)

E. Amphibians

Colorado River toad (Bufo alvarius)** (S)

This area represents a significant portion of the extremely limited range of the Gila Monster in New Mexico. This large lizard occurs primarily along the rough and broken terrain on either side of the river, including the drainage area of Cottonwood Canyon which would be crossed by the Virden alternate.

The four species of fish shown on Table 11 are totally endemic to the Gila River. The Gila spikedace definitely occurs in that section of the river being discussed. Although the Gila topminnow, loach minnow, and round tailed chub historically occurred here, it is not known for certain that they still remain.

Although the Rio Grande also offers permanent water and riparian vegetation, that section of the river which could be affected by the power line does not provide significant wildlife habitat nor does it support an important array of wildlife species.

Wildlife values over remaining portions of the route are best discussed by vegetative type of habitat. Of the various types discussed in the previous section, creosote offers the least valuable wildlife habitat in the area. This is especially true of the monotypic stands of creosote occurring in certain areas east of the Rio Grande Valley. However, creosote plants do provide limited habitat to a few small mammals, birds and reptiles. The plant provides shade and cover as well as seeds which are consumed by ground squirrels, pocket mice and kangaroo rats. In those areas which support other plant species in the interspaces between creosote plants, wildlife habitat is greatly improved. Plant

species commonly found in such associations include four-winged saltbush, mormon tea, mesquite and various grasses--all more important than creosote as wildlife habitat.

Mesquite types, including duned mesquite, provide much more valuable wildlife habitat than the creosote types. Mesquite is a major source of shade, nesting, and escape cover. The seed pods are eaten by quail, dove, rabbits, antelope, skunks, and a variety of rodents and non-game birds. The seed pods also comprise a significant portion of the diet for coyotes and foxes, particularly during winter months. Four-winged saltbush is commonly associated with mesquite and is one of the most important food sources to wildlife in the area. Seeds from this plant comprise a major portion of the diet for quail during certain seasons. Due to the abundance of prey species (i.e. small rodents and birds) in mesquite types, they offer valuable hunting areas to a variety of predators including coyotes, bobcats, and a number of birds of prey. The most common bird of prey found soaring over these areas is the marsh hawk (*Circus cyaneus*).

The most important vegetative type for birds of prey, other than the riparian habitats, is the yucca-grassland type which predominates between Deming and Lordsburg and again between Lordsburg and the Arizona-New Mexico line. Prairie falcons are fairly common here, and there is a distinct possibility that the Aplomado falcon (*Falco femoralis*) occasionally ranges northward into areas

which would be traversed by the power lines. One of the more favorable areas for this species appears to be in that area south of Summit and east of the Peloncillo Mountains. Records to date indicate the infrequent occurrence of the Aplomado falcon south of Lordsburg, in the Animas and Playas Valleys.

The yuccas associated with the yucca-grassland type are important in providing perch sites for many birds, including prairie falcons, Aplomado falcons, ravens, Swainson hawks (*Buteo swainsoni*), ferruginous hawks (*Buteo regalis*), red-tailed hawks (*Buteo jamaicensis*), and others. The yucca also provides nesting sites for other species of birds and a variety of reptiles. The associated grasslands provide habitat to a variety of small mammals, as well as larger herbivores such as pronghorn antelope (*Antilocapra americana*). Pronghorns are not numerous along the proposed routes but are occasionally seen between Deming and Lordsburg and in the area south of Summit.

The *other desert shrub vegetative type* located on the Burro Mountain piedmont supports a different faunal relationship than the vegetative types considered above. These differences, however, are not considered important to this discussion. Perhaps the greatest difference in species occurrence is among the reptiles.

A complete list of species known to occur in the area, either as permanent residents, seasonal migrants, or occasional visitors, is included in Appendix B.

C. Ecological Interrelationships

In general, the most complex plant and animal communities are found in the riparian habitats along the Rio Grande and Gila Rivers and in the various desert mountains and foothills located along the margins of the valleys through which the routes pass. The most important abiotic 1/ factor which has permitted the development of these communities is the increased availability of water. This relationship is obvious in the case of the riparian habitats but very subtle when considering biotic-abiotic 2/ relationships in the desert mountain communities. Several factors are operating here which, taken together, enable the mountainous areas to support a greater density and complexity of plant and animal species. The most obvious, of course, is the fact that the mountains receive more rainfall than surrounding valleys because of their uplift effect upon incoming frontal systems. Other factors are much less obvious. For instance, the rock and boulder surfaced soils are able to trap and hold moisture to a much greater degree than the barren valley soils. The rocks covering the soil surface accomplish this in two ways. First, runoff from the rock surfaces magnifies the amount of water made available for absorption

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1/ Abiotic factor: in this text, inorganic component of environment.

2/ Biotic factor: organic component of the environment.

into the soil. Second, much of the water which is absorbed percolates into the soil underlying the rocks and is held there for longer periods of time because of the shading and cooling effect provided by the rock itself. The effect is often dramatic, with a wide variety of grasses, forbs, shrubs, and trees being supported on these rocky sites. Another factor influencing moisture availability is the shading effect provided by north and east facing slopes. These slopes support greater plant densities and, in many cases, a different plant composition than adjoining south and west facing slopes. These abiotic-biotic interrelationships in the desert mountains are extremely delicate and can be easily impacted through surface disturbance.

Moving from the desert mountains, across the piedmonts, and onto the valley floors, the complexity of plant and animal communities generally decreases. The simplest communities are man caused or created. These include not only various crops grown in agricultural areas but also the almost monotypic stands of creosote and mesquite which were formed after the introduction of domestic livestock. These vegetative types are described above under B. 1 (flora). The most complex communities found in the valleys are the mesquite-saltbush associations, mesquite grasslands, and yucca grasslands. These, however, are much less complex than the riparian and desert mountain communities and are considered less important and less easily impacted. Some of the more significant ecological factors related to these communities, relevant to the proposed power lines, are described as follows:

1. Survival of desert and semi-desert grassland largely depends upon maintaining the integrity of microclimatic conditions formed within and below the foliage cover itself.

2. Once perennial vegetation is destroyed in desert environments, reestablishment is extremely slow due to limited water availability and high soil temperatures.

3. Soil disturbance and destruction of perennial vegetation results in higher than normal annual forb and grass production.

4. A number of bird species readily adapt to the use of manmade structures, such as perching and nesting sites. This especially applies to predaceous species.

5. Certain animal species are typically associated with loose sandy soils, while others prefer the harder soil structures characteristic of the mesas and foothills. The banner-tailed kangaroo rat is an example of the latter. This relationship seems relatively unimportant but is mentioned here as an ecological relationship which may be altered through soil compaction over the proposed routes.

D. Human Interest Values

1. Archaeology

Procedures and Means Used to Identify and Evaluate Cultural Resources:

A reconnaissance survey of the proposed transmission line route was performed for the New Mexico Environmental Institute by members of the Cultural Resources Management Division, Department of Sociology and Anthropology, New Mexico State University during August and September, 1973. An intensive survey of the prime route between Greenlee Substation in Arizona and Deming, New Mexico was performed by the same institution during March and April, 1975.

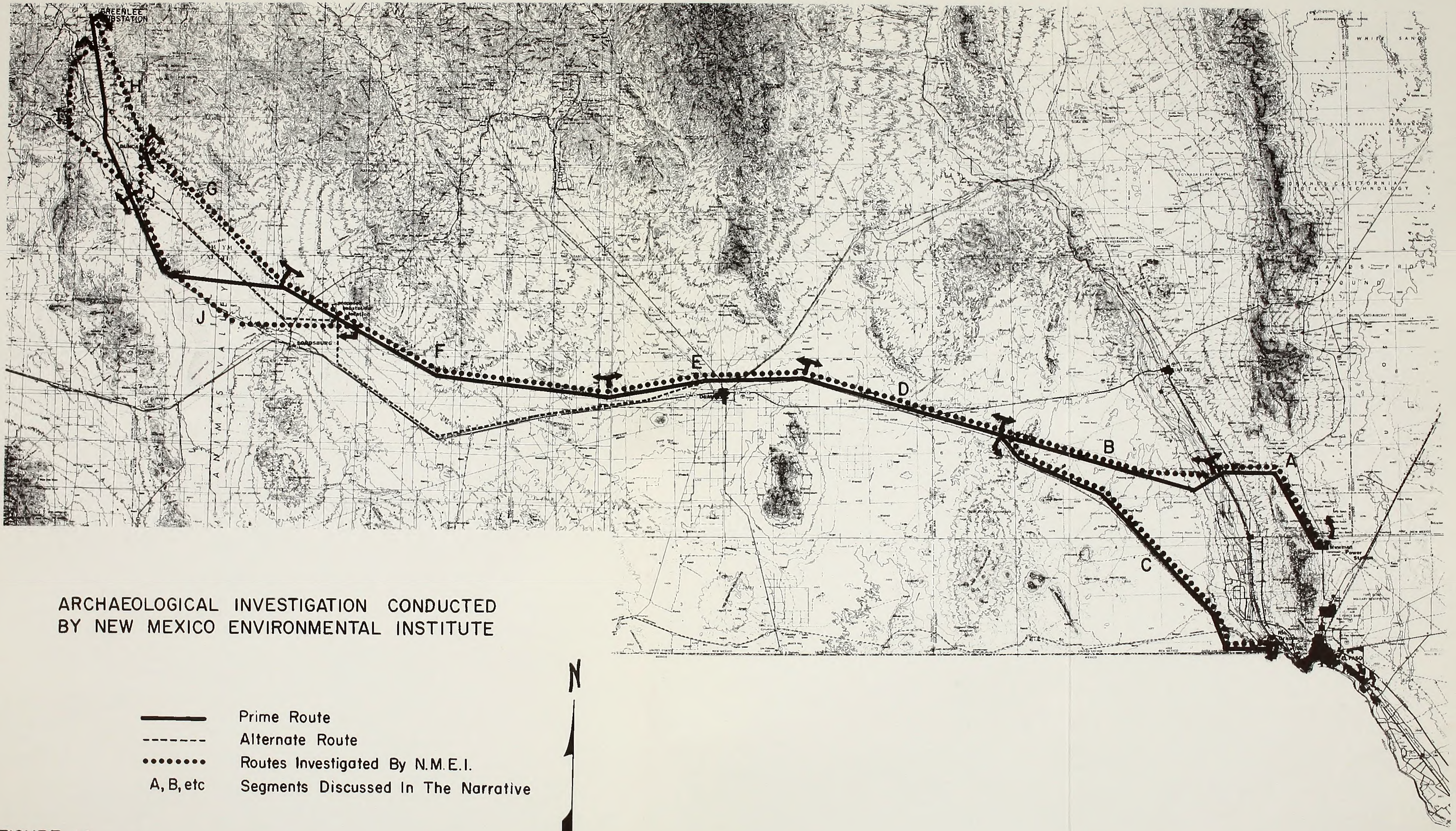
The Advisory Council on Historic Preservation reviewed the draft statement for this project and consulted with the staffs of the State Historic Preservation Officers of Arizona, New Mexico, and Texas. They determined that the project, as currently planned, will not affect known properties included in or eligible for inclusion in the National Register of Historic Preservation.

Cultural History of Project Area

An overview of the cultural resource history in the project area was prepared as part of the survey work performed by New Mexico State University. This information is included in Appendix G of this statement.

Summary of Known Cultural Resources

As a result of reconnaissance and intensive surveys 30 cultural properties have been inventoried in the project area. The distribution



ARCHAEOLOGICAL INVESTIGATION CONDUCTED BY NEW MEXICO ENVIRONMENTAL INSTITUTE

————	Prime Route
- - - - - - -	Alternate Route
••••••••	Routes Investigated By N.M.E.I.
A, B, etc	Segments Discussed In The Narrative

FIGURE 14

Scale: 1 in. = 12 miles (approx.)

of sites by cultural affiliation for each of the line segments is shown in Table 12. The locations of line segments are shown on Figure 14.

DISTRIBUTION OF SITES

	Cultural Affiliation				
Route Segement	Cochise	Jornada Mogollon	Western Mogollon	Multi Component	Unknown
A					
B	1	1			
C	4	2			
D	1		1	1	3
E	4	2	3		2
F					
G		1	2		1
H					
I					
J			1		

Table 12. Data from New Mexico Environmental Institute and New Mexico State University (1973-75).

The following is a brief description of the sites identified during the intensive survey from Greenlee Substation, Arizona to Deming, New Mexico.

Site PSC-1 is in Greenlee County. It is a small lithic site and is covered by residual gravel.

Site PSC-2, also in Greenlee County, is a one room historic site which was probably occupied around 1900.

Site PSC-3 is in Hidalgo County, New Mexico. It is a long, narrow, deflated area. There is a very good possibility that two components are present: a Mogollon site and a pre-ceramic Cochise site.

Site PSC-4, Hidalgo County, appears to have been a Jornada Mogollon campsight.

Site PSC-5, Hidalgo County, has numerous small rock clusters which are reminiscent of hearth areas.

Site PSC-6, Grant County, New Mexico, is an area of abundant potsherds and worked stone.

Site PSC-7, Grant County, is a possible stratified area with at least six pit houses visible.

Site PSC-8, Luna County, is an area with several hearths present. Scraper planes, spokeshaves, and side scrapers were found in the area.

Site PSC-9, Luna County, is composed of scattered concentrations of sherds and lithic materials.

Site PSC-10, Luna County, is a large deflated area containing a random scattering of lithics and glass aitifacts.

Site PSC-11, Luna County, is comprised of a scattered small number of Jornada Brown sherds.

Site PSC-12, Luna County, consists of a small scattering of sherds and a mano eroding out of the surface.

Site PSC-13, Luna County, contains ceramic evidence of a meager nature due to parts of the site being overlain by the old Camp Cody dump.

Four sites within the vicinity of the proposal route have been identified as possibly eligible for nomination to the National Register of

Historic Places. These sites are located on private lands or State lands. The project as proposed will not directly impact these sites.

Summary of Areas not Intensively Surveyed

An intensive survey has not been completed along the proposed route from El Paso, Texas to Deming, New Mexico. The initial reconnaissance of the area has determined that eleven sites definitely exist along these segments (A,B,C,& D). The survey archaeologists predict that more sites would be located during an intensive survey.

2. Aesthetics

It is generally agreed that the greatest impacts of power transmission lines are often upon the scenic and aesthetic qualities of the landscape. To evaluate these qualities, two distinct features of the landscape must be analyzed: scenic qualities and open space values. Considering these features in relation to highways and populated areas is also important, and this will be dealt with in section III which discusses anticipated impacts of the proposed lines upon the scenic resources.

a. Scenic Qualities

Scenic values are subject to personal opinion. Some people enjoy the open expanses of the desert, while others prefer dense, heavily wooded forests and consider the desert an uninteresting waste land. Personal views similarly differ on how objectionable power lines or other manmade structures are in a natural setting.

The BLM's manualized rating system for sightseeing and scenery qualities was used to evaluate the scenic resources along the proposed routes. This system uses a score sheet (Table 13) to evaluate scenic areas and compare them on a regional basis, in this case limited to desert regions of southwestern New Mexico. Six features are rated for each area: (1) land form, (2) color, (3) water, (4) vegetation, (5) uniqueness, and (6) intrusions. The resulting total score places the area in one of three categories discussed below. Figure 15 shows the areas evaluated and the results.

Category A

This is the highest rating that can be given an area. It is reserved for attractions that are truly outstanding in scenic beauty as measured by variety in land form, color, water, vegetation, uniqueness, and degree of intrusion. These areas are frequently characterized by vertical cliffs or massive rocks, presence of water, interesting or varied forms of vegetation, uniqueness to the region, and freedom from aesthetically undesirable sights and influences. Only one rating area shown in Table 13 and in Figure 15 fell into this category: The lower box of the Gila River. This area is truly unique to the region, containing steep canyon walls, colorful and highly contrasting rock and vegetation combinations, and a flowing river. All factors considered, the lower box of the Gila River is the most scenic area found in the immediate vicinity of any of the routes and is one of the most beautiful areas in the entire region.

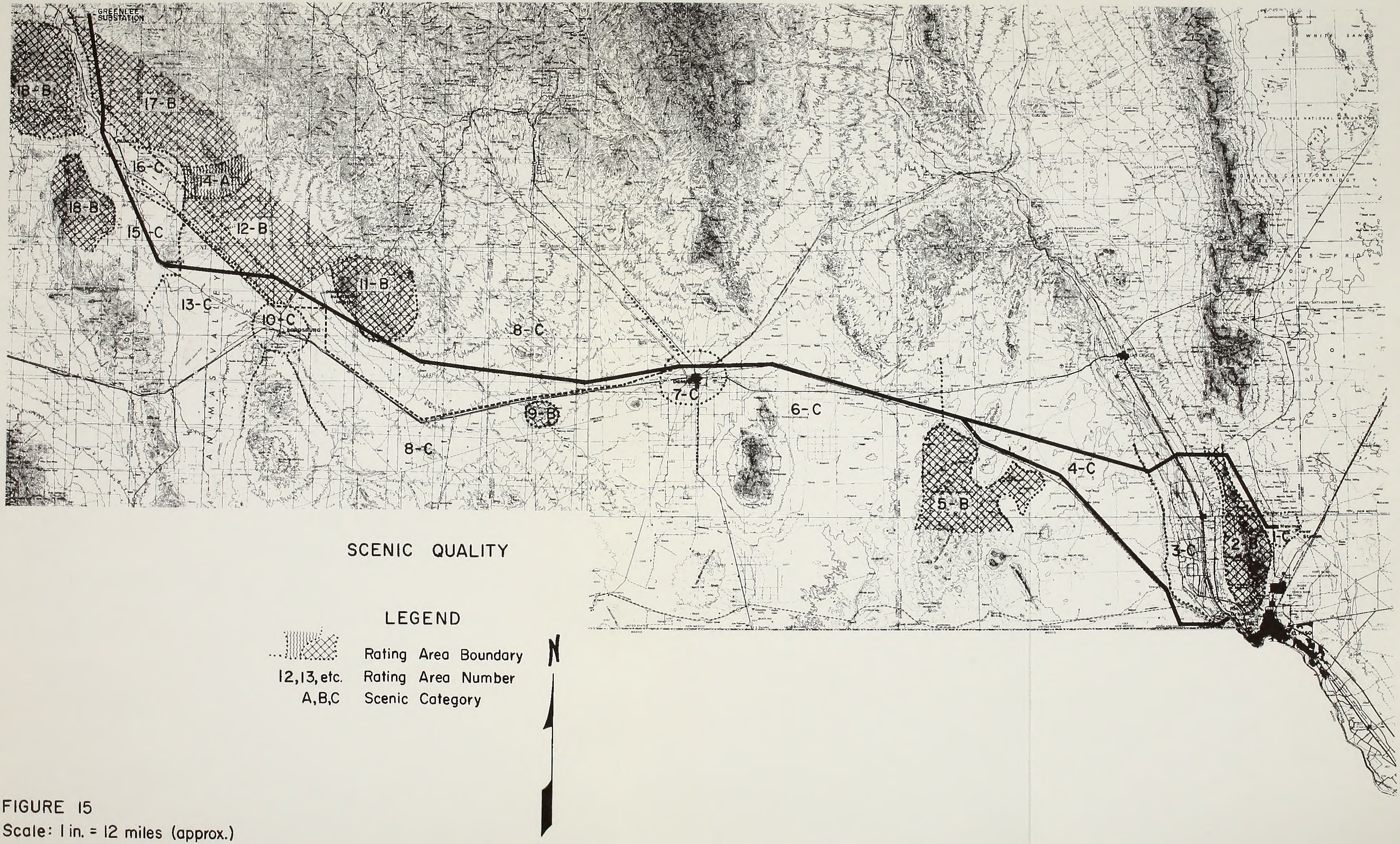


FIGURE 15
Scale: 1 in. = 12 miles (approx.)

Table 13

1. Date	UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT	CLASS	SCORE RANGE
March 18, 1974			7
2. Rater Paul Petty	QUALITY EVALUATION SCORESHEET	A	15 - 24
3. State New Mexico		B	10 - 14
4. District Las Cruces	6. Recreation Activity		
5. Plan Unit El Paso Electric Line	Sightseeing - Scenery	C	1 - 9

8. KEY FACTORS

9. RATING AREA		10. POINT MAXIMUM										
NO. (a)	NAME (b)	LAND FORM 4	COLOR 4	WATER 4	VEGETATION 4	UNIQUENESS 6	INTRUSIONS 2			11. TOTAL SCORE	12. CLASS	13. REMARKS
1	Newman Station	1	1	1	1	1	1			6	C	
2	Franklin Mtns	3	3	1	2	2	1			12	B	
3	Rio Grande Valley	1	1	2	2	1	-2			5	C	
4	Black Mtn Mesa	1	1	1	1	1	2			7	C	
5	*Portrillo Mtns	1	2	1	2	3	2			11	B	
6	Akalia	1	1	1	1	1	1			6	C	
7	Deming	1	1	1	1	1	-4			1	C	
8	Continental Divide	1	1	1	2	1	1			7	C	
9	Victoria Mtns	2	2	1	2	1	2			10	B	
10	Lordsburg	1	1	1	1	1	-4			1	C	
11	Burro Mtns	2	2	1	2	1	2			10	B	
12	Lordsburg Mesa	1	2	1	2	3	1			10	B	
13	Alkali Flats	1	1	2	1	1	2			8	C	
14	Gila River	4	4	3	3	6	2			22	A	
15	Duncan Pump Sta.	1	1	1	2	1	1			7	C	
16	Virden/Duncan	1	2	2	2	1	-2			6	C	
17	Summit Mtn Foothills	2	2	1	2	1	2			10	B	
18	Peloncillo Mtns	2	2	1	2	1	2			10	B	

*includes Aden Crater & Lava Flows

(Instructions on reverse)

Form 6110-10 (August 1972)

Category B

This category is generally characterized by interesting land forms, colorful features, variations in vegetation, and few intrusions. Although B-rated areas are less significant than those rated A, they are nevertheless considered valuable scenic resources. Six rating areas fell into this category. These will be discussed in the order they occur from east to west.

The Franklin Mountains are rather massive and are characterized by interesting geologic formations and erosional patterns. The most interesting portions of these mountains occur south of the New Mexico-Texas line near El Paso. The chain of small mountains north of the state line offers sufficient scenic value, nevertheless, to retain the B rating.

Midway between Deming and El Paso, the Potrillo Mountains and neighboring Aden Lava Flow are a rather unusual collection of extinct volcanic cones, sink holes, and lava fields. The dark colored mountains and related lava features provide a distinct contrast in color and land form with the surrounding areas.

Between Deming and Lordsburg, the Victorio Mountains and the Burro Mountain foothills are in contrast to the flat plains. They offer some variation in color and texture from the general landscape and are relatively free from aesthetic distractions.

The Lordsburg Mesa was considered an attraction even though it is somewhat ordinary in terms of land form. It is one of the

few easily accessible places in the region where a person can see 10 to 15 miles without visual intrusions. Huge beds of Carpet-of-Gold flowers add brillant color during much of the rainy season.

Rating areas 17 and 18 are heavily eroded foothills of the Peloncillo Mountains and the Summit Mountains. They have fair color contrast and a variety of vegetation. There are very few intrusions in either area.

Category C

Most of the scenery along the proposed routes falls into this category. Areas rated C are frequently characterized by flat valley bottoms or rolling hills, little contrast in color tones, absence of significant water bodies, little variation in vegetation, and lack of unique qualities. Intrusions are generally present but may vary from light to severe.

The lowest ratings occur around the urban areas of Deming and Lordsburg, due to extensive visual intrusions. The Virden and Rio Grande Valleys were also downgraded because of intrusions. The adverse scenic impact of numerous intrusions in the Virden and Rio Grande Valleys is partly offset by the presence of water and color variations added by cultivation.

Rating areas 1, 4, 6, 8, 13, and 15 are flat to gently rolling open range lands with little variety in topography or vegetation and no visible bodies of water (Table 13). Intrusions are moderate to light.

b. <u>Open Space Values</u>

The environmental impact study prepared by the New Mexico Environmental Institute appraised the open space situation in the southwest desert accurately in stating that open space constitutes a distinctive scenic feature. The presence of a transmission line in the midst of a broad natural expanse of desert certainly is significant. This is particularly true if the transmission line is constructed through an area otherwise free from development, since it becomes the first manmade obstruction on the landscape.

The potential routes under consideration in this study pass through several areas which are almost completely free from above ground intrusions. Figure 16 illustrates the more important areas which now are open space in character.

Of the open space areas shown, the Lordsburg Mesa is possibly the most outstanding. From U. S. 70, a person can see for 10 to 15 miles north of the highway without a single manmade structure in sight. The backdrop of the Big Burro Mountains adds to this feeling of vastness. The presence of the highway actually enhances the importance of this area by making it readily available to many people.

Only two of the remaining areas shown would actually be crossed by the proposed transmission lines. The area north of Interstate 10, between Deming and Lordsburg, is mostly closed to public access due to the large blocks of State and private lands

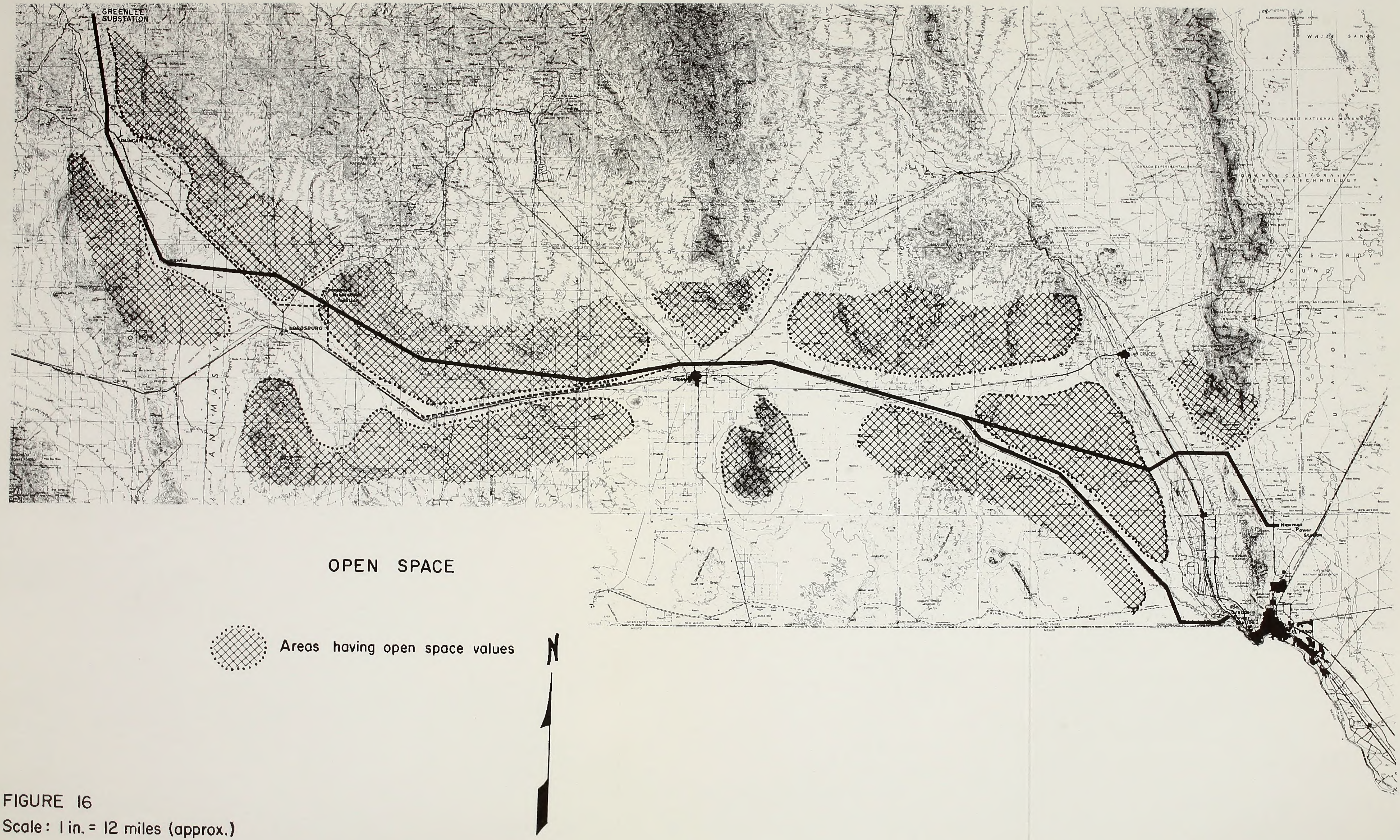


FIGURE 16
Scale: 1 in. = 12 miles (approx.)

in the area. The open space value there can at present be enjoyed by very few people. The second area is located just west of the Rio Grande Valley, between the Southern Pacific Railroad and Interstate 10. This expansive desert area offers open space value to people living in Las Cruces, New Mexico, El Paso, Texas, and the communities between these two cities. A person can drive through this area for many miles and encounter no manmade features other than a few fences, windmills, and country roads.

E. Probable Future Environment without Project Implementation

The BLM recently brought up to date its land use plans on NRL segments of the project area in New Mexico from El Paso, Texas to approximately 15 miles east of Deming, New Mexico and from the Arizona-New Mexico state line to the Greenlee substation in Arizona. The area between the Arizona state line and Lordsburg, New Mexico is currently being inventoried, with the land use plan scheduled for completion during fiscal year 1977. Land use planning has also been completed on the Arizona segments.

The completed plans recommend establishment of utility corridors along the same route that is the prime route studied in this impact statement. It appears safe to assume, therefore, that the environment of the project area would in any event remain relatively unchanged only until new pipelines and transmission lines were proposed and constructed. Since it is anticipated that the area along the proposed route will continue as a utility corridor, in effect the probable future environment if the proposed 345 KV lines were not installed would be the same as the existing environment plus any changes caused by other utilities that might be built in the future. (For further details, see earlier portions of section II- Environment and section III-Impacts.)

III. Environmental Impacts of the Proposed Action

The following discussions of environmental impacts, both adverse and beneficial, are presented in the same order as the environmental components described in the previous section. Both the prime routes and the alternate routes will be discussed to compare the impacts.

A. Non-living Components

1. Topography

Topography is considered here, not only as an environmental component which may be impacted itself, but more importantly because of its role in determining impact on related environmental components such as soil, aesthetics, watershed, hydrology, and vegetation. As impacts upon these components are discussed, topography will be considered.

Topography itself would be slightly altered where roads and structural assembly pads are constructed. Since "blade up" operation is possible over most of the route, this impact is considered inconsequential in all areas except one. The rough, roadless terrain between the Gila River and the Greenlee substation will require alteration during proposed road construction and leveling of structural assembly pads. The distance affected is 15 miles on the prime route or 21.5 miles over the Virden alternate. The former figure represents 6 percent of the total 251-mile length of the prime route, including first and second lines.

2. Climate

Although climate itself would not be affected, its influence on other impacts such as soil erosion, vegetal removal, and subsequent revegetation are important considerations. These relationships will be discussed under appropriate categories. Another important consideration is the possibility of structural damage to the power lines during climatic phenomena. The study by New Mexico Environmental Institute concludes that the possibility of weather-induced structural failures is remote. Its findings further indicate that, while lightning is an ever-present hazard and could cause severe damage in case of a direct strike on a structural pole, even this would probably not cause complete structural failure. (Reference NMEI, January 1974).

3. Geology

Geology is important primarily because geologic phenomena, like climate conditions, might affect the power line structure. The proposed lines would have no effect on the geology of the region.

The geologic phenomena of surface subsidence and earthquakes which could affect the proposed lines are discussed in Section II-A3 (Description of the Environment, Geology).

4. Soils

The New Mexico Environmental Institute study states: "One of the most critical problems concerning the soils environment when construction activities are involved is soil erosion. Surface

soil often represents many thousands of years of weathering or soil development. Once the soil surface is removed, usually the most important characteristics for the soil's use are also removed."

Impacts on soils occur any time the surface is disturbed. For transmission lines, surface disturbance is caused primarily when vegetation and desert pavement (the thin layer of rocks that protect the surface of many desert soils) are removed through blading or by repeated travel by wheeled and tracked equipment. Surface disturbance leaves the soil open to movement by wind and water while compaction acts to channel and accelerate water movement. Both caused accelerated erosion. The amount of erosion depends on several variables such as:

a. The size of individual soil particles (soil texture) indicated by the mix of clay, sand, and silt in each soil;
b. The permeability (the rate water moves through the the soil);
c. The moisture content of the soil;
d. The amount of stones and pebbles in the soil;
e. Related factors such as, steepness of slope and intensity of wind and rainfall, and;
f. The type of disturbance (blading, or driving over otherwise undisturbed surfaces).
g. Amount of surface cover, either vegetation and/or rock pavement, etc.

Each major soil association along the power line route was analyzed according to the above factors (see Table 7 Figure 9 in section II A-4, for description and location). The soil associations determined to be particularly susceptible are identified. For clarity, erosion resulting from surface disturbance will be discussed first, followed by a discussion of impacts associated with compaction.

The following soil associations of those shown in figure 9 were found to be most sensitive to erosion caused by surface disturbance:

4. Continental-Pinaleno-Cave
7. Luzena-Arp-Balon
11. Nickel-Upton-Tres Hermanos
13. Rockland-Lehmans
14. Rough Broken Land

Of these, the Rough Broken Land soil association would be most affected in terms of geographical extent. Found along both sides of the Rio Grande Valley and from the Gila River to the Greenlee substation, this soil association would be crossed for approximately 20 miles, 15 of them north of the Gila River (Figure 9). Avoiding this area would not alleviate the impact, since equally fragile soils occur in surrounding areas. The areas to be crossed on this soil association do not now have suitable access for construction purposes. Therefore, trunk roads must be built.

Depending on the route used, crossing the Nickle-Upton-Tres Hermanos soil association could also result in adverse impacts upon the soil resource. This association lies mostly east of the Arizona-New Mexico state line, from Summit northward across the Gila River. Access is available on both the prime route and the U. S. 70 alternate route across this area. However, the Virden alternate does not have access available. The Virden alternate route, therefore, would produce the greatest impact on the soils in that vicinity.

An additional complication in the general area between Summit and Duncan, increasingly popular for recreational uses, is concern over increased off-road vehicle use there and south of Duncan. This land management problem could be aggravated by construction of any access roads, with possible erosion impacts in areas of Nickel-Upton-Tres Hermanos and Continental-Pinaleno-Cave soil associations in the general vicinity.

The other soil associations listed above would not be seriously impacted because of limited crossing and/or the presence of existing access.

Soil compaction can increase erosion in at least three ways: (1) Compaction occurring along vehicle tracks can channelize runoff, accelerate it, and increase the cutting action of water; (2) compacted soils usually support less vegetal density, and (3) compacted soils have less permeability than non-compacted soils. The following soil associations are the most susceptible to compaction and, therefore, are subject to the greatest impact of this nature:

1. Bluepoint - Onite
2. Bluepoint - Yturbide
10. Nickel-Tencee-Delnorte
11. Nickel-Upton-Tres Hermanos
14. Rough Broken Land
15. Simona-Cacique-Tonuco

The reader should again refer to Figure 9 for location of the above soils along the proposed routes. These soils are primarily

located on upland sites east of the Rio Grande and from the Lordsburg Mesa to the Greenlee substation in the western stretches of the study area. The greatest impact would occur in roadless areas. The degree of impact would depend upon the weight and type of vehicles, the frequency of vehicular traffic during construction, the amount of continued vehicular traffic after construction, and the soil moisture content present at the time of compaction.

Roadless segments of the various routes which cross the above soil associations include:

(1) From the angle point located north of the Franklin Mountains westward to Interstate 10.

(2) From the west edge of the Rio Grande Valley to the intersect point with the El Paso Natural Gas line.

(3) From the Gila River crossing northward along the prime route to the Greenlee substation.

(4) From the west edge of the Lordsburg Mesa northwestward along the Virden alternate to the Greenlee substation.

Here again, construction that encouraged access to off-road vehicles in the Nickle-Upton-Tres Hermanos soil areas could produce some soil compaction.

The amount of erosion caused by surface disturbance and/or compaction cannot be quantified without further studies. Studies on each soil to measure existing erosion rates followed by studies after disturbance to measure increased erosion attributable to

the project would be required. Studies of this nature are not practical given the length of line and variation in soils traversed. In addition, the unavoidable impacts on productivity and on water quality identified in Section V do not appear to warrant intensive studies of this nature.

5. Hydrology

a. Ground water

The power lines could have an indirect impact upon the already heavily pumped Mimbres Basin near Deming, New Mexico. Extensive real estate subdividing and marketing are occurring in the Deming area. Enough of these subdivisions have been sold that, if each were occupied by average-sized families, the area could have a population of more than 300,000 compared with the present county population of 12,000. The additional electricity provided by this transmission line is one factor which could add to the possibility of this population increase, without causing it. Unconstrained land development is most directly responsible for this potential impact.

b. Surface water

Although impacts on surface water quality are expected to be minor, some discussion is warranted.

Disturbance of soil surfaces would result in increased erosion, which in turn might increase the sediment load of runoff. This impact would be virtually undetectable due to the high sediment load already present in runoff throughout the area, except

for the Gila River which generally runs clear except when flooding. In addition, there could be some small temporary or permanent changes in drainage patterns caused by road building.

Minor contamination of surface water could result from careless disposal of garbage, chemicals, and petroleum products during construction.

6. Land Use

a. Land ownership

Term easements with renewal provisions (50 years on National Resource Lands) are granted across Federal and State lands. Therefore, no changes in ownership are involved in right-of-way on these lands. Although fee title is often acquired across private lands, the companies' policies state that, "Preferably, easements will be purchased rather than acquiring the land outright thus permitting its utilization for other purposes."

b. Major land uses

This subject is best approached by discussing the individual land uses found in the study area separately. These include: crop production, livestock production, residential use, military use, industrial activities, recreational uses, and public utilities. Much of the following information is quoted from NMEI's environmental study of the routes, since the BLM after its own review fully concurs with the observations involved.

(1) Crop production

Cultivation practices on agricultural lands might be modified due to the presence of the transmission lines.

The aerial application of fertilizers and pesticides would be impeded in areas where the lines pass through or near agricultural lands. From a safety standpoint, transmission lines are viewed as a potential obstruction and danger to crop dusters. The presence of the lines might also modify ground operations. Farm land between poles can be lost from row crop production, and land directly adjacent to the poles cannot be mechanically cultivated with farm equipment. The result is a reduction in total land which can be cultivated. As the company has not yet acquired right-of-way across the agricultural areas, it is impossible to fully assess the degree of these impacts. One example of comparative impacts related to the various routing alternatives is to be found west of Lordsburg, where the Virden alternate would involve crossing approximately 2½ miles of highly productive agricultural land as compared to a ½-mile crossing if either the prime route or the U.S. 70 alternate were used.

Regarding easement across agricultural areas, the company has indicated that it will attempt to parallel existing roads to reduce impacts and facilitate maintenance operations. Although some farm income might be lost as a result of the proposed lines, some compensation is to be realized through easement payments. Empirical studies regarding the impact of easements on agricultural land values have indicated that: "Most types of farms show insignificant market value decrease caused by typical transmission

line crossing. This conclusion appears to be valid despite a number of 'formulas' which purport to measure damages by the additional operating time necessary to cultivate land around towers, or by some percentage of fee value, etc." (Clark and Treadway, 1972).

(2) Livestock production

Other than the fact that some forage will be destroyed during construction activities, lands used for grazing will not be impaired by the proposed transmission lines. Since "blade up" operations are possible over most of the route, forage lost as a result of vegetal clearing would be minimized; however, some clearing would be required in rougher terrain and in creosote and mesquite-dominated vegetative types. Such areas normally represent poorer range lands which support mostly low value shrubs from the standpoint of livestock production. The better forage types would not require clearing; however, forage loss would be caused on these sites by vehicular traffic and other construction activities. Based on observations in this area, a major share of the forage lost due to vehicular travel without clearing should recover within two years if further damage is prevented after construction has been completed.

An indication of the maximum amount of forage that could be lost during construction was derived by first estimating the miles of power line crossing involved for each vegetative type shown in

Figure 14. An estimate then was made of the maximum number of acres that could be disturbed, or cleared, allowing for a 12-foot-wide swath for an access road and 6.6 tower assembly pads--each 50 x 100 feet in size--per mile. This resulted in 2.25 acres per mile being cleared, at a maximum, along stretches of right-of-way requiring an access road.

Resulting acreage of disturbance by vegetative type is as follows:

Vegetative type	Mesquite	Yucca Grassland	Creosote	Foothill Yucca	Cropland & Riparian
Miles crossed	84	90	58	14	6
Acres cleared (at 2.25 ac./mile)	189 ac.	202 ac.	131 ac.	32 ac.	13.5 ac.

So far as loss of forage is concerned, mesquite and creosote types of vegetation are deemed the only ones in which possible disturbance merits consideration. The grassland and other types can be crossed without clearing. Based on livestock carrying capacities of 25 acres per Animal Unit Month (AUM: forage needed to support one cow with calf for one month) for creosote-dominated range and 10 acres per AUM for mesquite range, the clearing could at a maximum destroy 19 AUMs of mesquite forage and 5 AUMs of forage in the creosote type. The total loss along the power lines, then, would amount to a maximum of 24 AUMs, or enough feed to support two cows and their calves for one year. This, again,

assumes the maximum disturbance which could result during construction. In actual practice, disturbance will be considerably less due to the presence of existing access and the fact that not all assembly pads will require clearing.

(3) Residential use

There are seven present, planned, or potential residential areas in or near the proposed right-of-way for the transmission lines:

(a) The town of Vado, New Mexico.

(b) The Rio Grande Valley area near El Paso Electric Company's Rio Grande Power Station.

(c) The proposed Anapra, New Mexico, Port of Entry on the international boundary west of El Paso.

(d) The proposed development site for the Santa Teresa residential community (Figure 11).

(e) The residential area immediately north of Deming.

(f) The Virden Valley.

(g) The proposed crossing site on the Gila River west of Duncan, Arizona.

Of these, the proposed site for the Gila River crossing will be the least impacted. This is due to the presence of the existing natural gas pipeline, scattered housing, and the small amount of land to be impacted in this area. The degree of impact upon the

other areas is difficult to determine because the precise alignments of the transmission lines through these areas have not been determined. However, a number of conclusions can be made.

For residential lands there are four ways in which losses caused by the presence of a transmission line may be reflected:

1. Reduction in the selling price of lots.

2. Requirement of a larger area for each lot adjoining the right-of-way.

3. Longer than average time needed to sell lots or residences.

4. Construction of relatively cheaper homes on lots along the right-of-way, or price concessions for these houses (Clark and Treadway, 1972).

Literature on transmission line impact indicates the "value of most residential properties is neither appreciably nor measurably adversely affected by transmission line right-of-way." (Kinnard, 1967)

To ascertain further the effect the proposed transmission lines might have upon real estate values, the New Mexico Environmental Institute conducted an opinion survey. Five realtors in southwestern New Mexico were asked for their opinions. Three realtors said transmission lines have no adverse effects on residential property values in the area, while two realtors felt transmission lines had adverse impacts on residential land values

in the immediate vicinities. These opinions were based on the personal experiences of the realtors. It should be stressed that this finding does not provide a guideline for predicting changes in land values and is presented only as a suggestion of local opinion on the question.

There have been studies of homeowner attitudes concerning the effect of power lines on property values. The consensus in appraisal literature regarding owner attitudes is that the presence of a transmission line in an area will generally not alter the future selling price of a home (Kinnard, 1967).

To provide a local comparison for these indicated trends, interviews were conducted in two sections of northeast Las Cruces. One set of interviews occurred within the immediate vicinity of a transmission line, the other in an unencumbered area.

Of the 17 homeowners interviewed in the encumbered area, 16 had bought their house after the line had been constructed. Of these 16, 6 said the area is less attractive as a result of the transmission line. All said the line had no effect on the price they were willing to pay for the property. These findings could be interpreted as indicating that lack of apparent impact on market values or willingness to purchase in this instance reflects the insignificance of visual and auditory effects from the nearby power line. On the other hand, the one person who bought a home

before the power line construction--and without prior knowledge of this development--contended that the power line depreciated the property value by 5 to 10 percent.

Of the 17 homeowners questioned in an area free from the transmission lines, 13 said the proximity of a line would affect their decision to buy, and 12 further stated it would affect their buying price. These responses seem to indicate not only that the anticipation of living near a transmission line right-of-way is worse than the reality, but also that such a line may well influence adversely the decisions of some prospective residential property buyers.

The preceding discussion has considered possible adverse land value changes in event of interference with present land uses. It appears more certain that land values in the general vicinity of the proposed route, as contrasted with residential values adjacent to the right-of-way, would be favorably altered by the transmission lines. Since the proposed lines would serve as an additional source of power in the region, the possibilities for local growth and development would be enhanced. Resulting capital investment would in turn raise existing land values.

(4) Military use

Military activities on that portion of the Fort Bliss Military Reservation will not be affected by the proposed construction.

(5) Industrial activities

Generally speaking, industrial concerns served by the El Paso Electric Company will be benefited by the proposed transmission lines. With proper coordination, the second line could be routed so as to benefit also the possible future industrial development of the Anapra area. In the absence of such coordination, however, the line by delivering its electric power elsewhere could postpone, at least, Anapra area development so far as it depends on a reliable power supply not now available. Lack of coordination also could cause environmental impacts which were adverse from the standpoint of future Anapra area development. In preconstruction conferences, these factors will be taken into consideration in determining the routing of the proposed power line.

(6) Recreational uses

(a) Recreational Activities

Off-road vehicle activity (jeeps, motorcycles, and dune buggies) is mostly occurring in the eastern portions of the study area, from the Franklin Mountains west to the vicinity of the Potrillo Mountains and Aden Hills. It occurs to a lesser extent throughout the study area, particularly in areas surrounding the Summit Hills and the Peloncillo Mountains

near the Arizona-New Mexico state line. The presence of the proposed power lines will not adversely affect this activity.

The Potrillo Mountains and the Aden Lava Flow are frequently toured by residents of El Paso, Las Cruces, and nearby communities in the Rio Grande Valley. Although these areas would not be crossed by the transmission lines, the proposed route is close enough to lessen somewhat the enjoyment of recreational activity there. This impact would be relatively minor, as the route parallels existing intrusions through the area: The Southern Pacific Railroad and associated telephone lines and maintenance roads.

Small game hunting, rock collecting, and arrowhead hunting are pursued over much of the study area. The transmission lines should not hinder these activities.

(b) Designated Recreational Lands

As proposed, the first transmission line would pass immediately south of the Organ Mountains Recreational Lands. Included in the recreation plan of development for this area is a scenic road which would pass through the recreational lands and intersect Interstate 10 at the Vado interchange. The transmission line would be visible along the first several miles of this road as well as from some of the higher elevations located in the interior portions of the recreation lands.

(c) Other Recreational Lands

As discussed in previous sections, portions of the Gila River have been considered for designation under

the Wild and Scenic River Act of 1968. The qualities of this river which prompted this consideration would be seriously impacted by the Virden alternate route. To a lesser degree, the U.S. 70 alternate between Lordsburg and Duncan would also impact the river. Except for a single telephone line which parallels this highway on the south side, no intrusions are present to spoil the view while traveling from Lordsburg to the Gila River via U.S. 70. The existing unspoiled view between the highway and the Gila River presently preserves the wild and scenic qualities of the river. Therefore, locating the transmission lines in this area would adversely impact this visual relationship between the highway and the river.

(d) Recreation Developments

The highway rest stops located on Interstate 10 between Deming and Lordsburg would be adversely impacted if the Interstate 10 alternate route was used.

There is a distinct possibility that the power lines and telephone lines which now interfere with the scenic and open space qualities surrounding these rest stops will be removed or placed underground in the next few years. Placing the proposed power lines along this route would result in a significant intrusion which would probably remain for many years.

7. Public Utilities

The proposed transmission lines would parallel railroads, overhead telephone lines, buried telephone lines,

smaller power lines, and gas pipelines along most of the prime route. It is possible that each of these utilities could be adversely affected to one degree or another; however, impacts upon the gas lines, railroad, and overhead telephone lines could apparently be the most significant. To ascertain these impacts, the study team devoted a good deal of time and effort, relying primarily upon information submitted by those companies most likely to be affected by the proposed transmission lines.

Two pipeline companies were consulted, El Paso Natural Gas Company and Southern Pacific Pipeline Company. A report submitted by the former company indicates concern over possible maintenance problems as well as possible electrical interference upon its pipeline systems. A summary of its report follows:

> "From the available facts and calculations, it has been determined that problems would be created by the parallel operation of the two 345 KV power lines by the El Paso Electric Company alongside our existing pipeline. The types of problems are both physical and electrical and are both continuous and transient.
>
> The physical problems are related to operation and/or maintenance of pipelines in the vicinity of high-voltage power lines and to joint use of surface facilities such as pipeline roads. The electrical problems are related to safety of personnel and to the integrity of pipe protective measures such as coating and cathodic protection systems. From a physical standpoint, adjacent use of rights-of-way would cause special safety precautions to be instituted by operating personnel and joint use of pipeline roads by construction or maintenance vehicles would cause additional right-of-way maintenance. The exact amount of additional operating costs incurred is beyond the scope of this report.
>
> Electrically, the possible hazards of adjacent line operation are less apparent to personnel and, therefore,

probably more of a concern. Actually, a hazard can result from normal power line operation due to inductive coupling between the power conductor and the buried pipeline. The degree of hazard is a function of several variables and can only be estimated by calculations. Also, a hazard can result from a transient line-to-ground fault in the vicinity of the parallel pipeline which could puncture coatings and/or cause high potentials to exist on pipes for a short period of time. The first condition is less hazardous, but always existing while the second is more serious, but occurs rarely.

Only by tests after the lines are in operation can the exact amount of hazard be determined. Even then, the same conditions of line loading, coating condition, soil resistivity, etc., may never be duplicated, so the results are not conclusive. A conservative approach would be to accept the maximum potential hazard as the design condition and determine the degree of additional pipe and personnel protection required for that condition."

El Paso Natural Gas Company completed a series of mathematical predictions in an effort to determine a suitable separation distance between the power lines and its pipelines. Although subject to a good many variables, (e.g., the length of pipeline to be continuously paralleled, soil resistivity, magnitudes of A/C transmission current flow, coating conductance of the pipeline, etc.), the company's calculations indicated that a 1,000-foot separation would be discreet, particularly on those sections where very long, continuous paralleling would occur.

The study team also contacted Southern Pacific Transportation Company to identify any possible adverse impacts the proposed power lines might have on its railroads and associated signal and communication equipment. This company's concern was centered in the stretch between Deming, New Mexico and El Paso, Texas, where

the company has highly sensitive equipment installed. The equipment includes four distinct systems: (1) Supervisory control system; (2) Train detection and broken rail protection system; (3) Wayside relay logic system; and (4) Hot box detector systems. A brief description of each will precede discussion of how the power lines may adversely affect them.

The supervisory control system consists of local direct current (DC) open line sections using DC coded impulses to control each station. Field stations respond to coded impulses and polarity reversals produced by the transmit end of each line section. The field stations report coded impulses back toward the transmit end of each line section by means of applying line shunts across the open line pair by way of relay contacts. These shunts produce small changes in line current which are interpreted at the transmit end of the line section. The line section consists of a balanced DC circuit. If the transmit end of the DC line section is located remotely from the dispatcher control point, it becomes necessary to control it via microwave or line carrier superimposed on consecutive DC line sections between the section being controlled and the office. This particular area uses open line frequency shift carrier.

Train detection is provided through the use of balanced DC track circuits which also provide detection of broken rails. The circuits in this area consist of a primary track battery (approximately 1.25 VDC output) at one end of the circuit and a 4-ohm non-biased DC track relay on the other end. The individual track

sections are separated by using insulated joints. When a train enters a section, the current supplied by the track battery is shunted away from the coils of the relay through the train axles. A .06-ohm shunting sensitivity must be maintained under rules of the Department of Transportation. Broken rails are detected by the breaking of the circuit path to the relay.

The wayside relay logic system is important for safety of train operation in this area. The circuits that are responsible for signal aspect information and safety of train operation use relays which are designed on fail safe principles. The relays used in this area are non-biased relays. All DC batteries used for supplying these fail safe circuits must be ground free for safety of operation in accordance with the rules set forth by the Department of Transportation.

Several different types of hot box detective systems, consisting of fairly sophisticated electronic circuitry, exist in this area. Carrier circuits in the range of 20 KHZ to 350 KHZ are sometimes used in connection with hot box detectors and other detective devices.

In response to an inquiry as to how the above systems might be affected, Southern Pacific Transportation Company responded with the following list of potential impacts:

"a. Nuisance-type interference with signal system as a result of inductive coupling between power line and signal apparatus which also may result in possible damage to signal equipment.

b. Unsafe operation of signal system as a result of inductive interference mentioned above as well as the possibility of equipment damage to signal equipment.

c. Nuisance-type interference with signal system as a result of a power line fault which may also result in signal equipment damage.

d. Unsafe operation of signal system as a result of power line fault with no existing signal line or track fault condition which may result in equipment damage and personnel injury as well.

e. Unsafe operation of signal system as a result of power line fault and existing signal line or track fault condition which may result in equipment damage and personnel injury.

All items above would be of major concern to us in this area. Broken rail protection, shunting capabilities, and overall track circuit system capabilities could be in jeopardy. Due to the nature of track circuits, it is extremely difficult to make tests or any type of predictions as to what the problems would be if they were exposed to such conditions. It is impossible to the best of our knowledge to simulate such conditions without the actual facilities existing in their respective environment. The most important thing to note about track circuits is that they are highly sensitive circuits that work over a wide margin of adjustment. This margin of adjustment, although covering a wide range, is extremely critical for positive train detection and broken rail detection which are required by the Department of Transportation.

The entire safety of the signal system is dependent on the wayside logic. It is, therefore, imperative that these systems be protected against foreign sources which may affect their operation. We rely on the hot box systems as a deterrent to burned-off journals which could result in costly derailments as well as other hazardous conditions."

Impacts on above ground telephone lines are primarily related to interference on those which have not been transposed. Transposition can simply be defined as the reversal of the relative position of the wires at frequent intervals along the line. Opinions on the distance required between high voltage power lines and non-transposed telephone lines are apparently quite varied, ranging from ¼ to 1 mile. The study team did not conduct a thorough study to determine if non-transposed telephone lines would be encountered. The few that were investigated during our field studies were found to be transposed.

Design specifications for the proposed power lines call for all hardware to be bonded and grounded. The New Mexico Environmental Institute conducted studies of possible radio and television interference on El Paso Electric Company's existing West Mesa 345 KV line. No interference was found. It is, therefore, assumed that grounding of the proposed lines to standards at least as rigid as those on the West Mesa Line--to be required by BLM--will ensure that very little radio or television interference will result.

B. Living Components

1. Flora

Impacts upon the vegetation found in the area would vary in nature and degree by vegetative types; therefore, each of the previously described vegetative types will be discussed separately (Refer to Figure 13).

a. Mesquite

Most of the routing segments which pass through this vegetative type are along existing access roads. There are three exceptions: The Virden alternate route on Lordsburg Mesa, the prime route on either side of U.S. 70 on Lordsburg Mesa, and the prime route for the second line in the area just west of the Rio Grande Valley before the railroad is intersected. In these areas, a trunk road would be constructed, resulting in additional destruction of vegetation compared with areas where major access already exists.

The density of mesquite is highly variable throughout the study area; therefore, the need to clear vegetation along the spur roads leading to structural assembly pads will vary accordingly. Most duned mesquite and mesquite-saltbush associations would require clearing, both on spur roads and the 50' x 100' assembly pads. Although much of the mesquite grassland type would permit access to the assembly pads without clearing, the assembly pads themselves would have to be cleared of mesquite to allow construction of the towers.

Local opinions vary as to the seriousness of clearing in mesquite types. Some feel that any destruction of vegetation, regardless of the value of the particular species involved, constitutes a significant impact. Others look upon mesquite as a less valuable "invader species" which reduces the capacity of the land to support better forage and watershed cover. To these people, mesquite clearing, as a result of almost any activity, represents a beneficial impact. Clearing of mesquite and leveling of dunes frequently results in at least a temporary increase of grasses and annual forbs.

b. Yucca Grassland

All routes passing through this vegetative type follow existing access except for portions of the Lordsburg Mesa crossed by the prime route and the Virden alternate. Very little if any clearing will be required. The primary impact will depend upon the degree of soil compaction caused by overland travel in vehicles during construction, and continued travel by other users after construction is completed.

With "blade up" operation to be required by BLM in this type and travel across impacted areas to be restricted where feasible after construction, vegetal disturbance in this type should heal completely within 3 to 5 years.

There is a grass fire hazard in this type of growth, especially in the tobosa grass swales; however, fire is not particularly damaging to these areas as most grass species are capable

of full recovery in a single growing season. However, black grama--perhaps the most valuable grass species--and associated species such as yucca and sumac may be seriously damaged or killed in such fires.

c. Creosote

Much of the route passing through the creosote type vegetation does not parallel existing access. This includes stretches from the angle point north of the Franklin Mountains west to Interstate 10, between the Gila River and the Greenlee Substation, and from the substation to the Virden Valley along the Virden alternate. The route from Summit to Duncan, although running roughly parallel to the railroad, also is roadless along the power line route itself.

Creosote would be cleared to permit access since it can puncture rubber tires. The initial impact results first from blading away of the vegetation and secondly from damage to the soil structure through compaction. The erosion which frequently follows often leaves the soil less capable of supporting the original vegetation. However, creosote resprouts and many species found associated with it are quite prolific and are capable of reoccupying these disturbed areas in a relatively short period. As discussed in detail earlier, it is estimated that, at most, 131 acres of creosote vegetation would require cutting, spread over a possible 58 miles of right-of-way.

d. Foothill Yucca

Access is presently available along the prime route through this vegetative type. While vegetal clearing along spur roads should not be required, some clearing of the larger species (i.e., mesquite, yucca, and little leaf sumac) would be required on the tower sites. Referring again to the detail given earlier, it is estimated that clearing would be needed on a maximum of 14 miles of right-of-way and would not exceed a total of 32 acres. Vehicular travel on the spur roads and tower sites is not expected to occur to any great extent after construction. As a result, disturbed areas should revegetate to former conditions in 3 to 5 years.

e. Cropland

Impacts upon cropland are discussed under Part III, A6.

f. Riparian

None of the routes being considered would seriously impact the streamside vegetation at the Rio Grande and Gila River crossings. The "semi-riparian" vegetation found along the numerous washes in the study area could be adversely impacted if construction crews failed to use existing access to its full advantage. New crossings of these washes normally require the removal of the dense vegetation found adjacent to the drainage channel.

2. Fauna

Comparing the various routes, the Virden alternate would potentially impact the most valuable faunal community found in the study area, the lower box of the Gila River. The following is a summary of the ways the power lines might adversely influence the animals found there.

a. Construction activities would destroy habitat, burrowing, and nesting sites at or near the ground surface. The Gila Monster could be impacted.

b. Construction crews might willingly kill certain animals, particularly certain species of reptiles, including the Gila Monster.

c. Construction activities in the area of Black Mountain, a known hunting and nesting area for prairie falcons, could adversely affect this species.

Although somewhat conjectural, the adding of power pole structures which provide new perch sites in this habitat might result in an increased number and variety of other birds of prey. This would force the prairie falcons to compete for the food and territory they now possess unmolested. In addition, locating the power lines and associated access roads in the proximity of this known prairie falcon habitat would increase the possibility that some of the birds would be shot.

d. Watershed disturbance in the Cottonwood Canyon drainage basin could increase siltation in the Gila River, thereby impacting the Gila spikedace.

e. Increased human activity along construction roads after completion of the power lines could impact presently remote areas of the river and adjacent habitats.

f. A small herd of antelope inhabits the area and roams between Arizona and New Mexico. If construction roads are left open there may be some adverse impacts on this herd.

Additional coverage of the impacts and/or changes in the faunal characteristics of the study area are discussed under ecological interrelationships.

C. Ecological Interrelationships

Impacts of the proposed construction upon local ecosystems will be minor and will mostly result from the alteration of abiotic components. Many of the impacts upon these components such as soils, topography, and hydrology have already been described and related to the biotic elements (i.e., flora and fauna) in previous discussions. There are a few additional considerations, however. These are itemized below:

1. Minor changes in flow pattern of surface runoff, as a result of road construction, may cause some degradation of certain vegetative communities which are dependent on seasonal flooding. These include tobosa grass swales and the "semi-riparian" vegetation associated with drainages.

2. Transmission towers and lines provide perching sites for certain raptors which prey on small mammalian fauna. However, Kendeigh (1961) stated that population levels of rodents appear to be determined more by the availability of food and water than by predation. Therefore, although the transmission lines will probably change prey-predator relationships wherever they are located, this will not be especially detrimental to prey species. (NMEI, 1974)

Al Rodney, biologist for Public Service Company of New Mexico, has conducted extensive studies on birds of prey and how power lines may influence their activities and habitats. For the benefit of this impact study, Rodney provided the study team a

preliminary summary of his findings (Appendix F). Basically, his studies indicate that power lines are utilized by a number of species of birds of prey, namely: Golden eagles, red-tailed hawks, and American kestrels in this area.

3. Altered soil conditions along the roadways used during construction may bring about minor changes in local ecosystems. Loose soils converted to compacted or rocky roadways may encourage invasion of compact soil dwellers such as Merriman's kangaroo rats and the southern grasshopper mouse, while compact soils converted to loose or sandy habitats may encourage invasions by sandy soil dwellers such as Ord's kangaroo rats and the northern grasshopper mouse. The resulting increase in rodent diversity in the disturbed area could possibly contribute to population increases in predators, such as hawks, coyotes, and foxes. (NMEI, 1974)

4. Temporary roadways which bring about the invasion of forbs and grasses will increase food and cover availability for Gambel's quail, scaled quail, and other graminivorous birds (Whiteford, et al., 1972).

5. A previous study of the effect of power lines on avian populations in southern New Mexico reported that golden eagles, cactus wrens, white necked ravens, and some hawks will select high voltage towers for nesting as an alternative to natural sites. These species require high sites which are limited in desert communities. (NMEI, 1974) The companies follow a policy of leaving bird nests found on their transmission line towers unmolested.

D. Human Interest Values

1. Archaeology

Sources of possible damage to archaeological sites fall into four categories: Power line construction, road construction, random activity by construction crews, and destruction by visitors who use the roads after construction. These possible sources of damage are discussed below (NMEI, 1974).

Construction of roads, leveling of structural assembly pads, drilling pole footings, traversing the terrain with construction equipment, and location of storage areas are all sources of damage to archaeological sites during construction operations. Although projects of this size are carefully planned and controlled, the possibility of damage inevitably remains.

Outside routine construction activities, construction crews have been known to use company equipment to dig out prehistoric ruins beyond the construction zone in order to find pots and other artifacts.

Vandalism often continues, or even increases, after construction operations have ceased. Archaeological materials from southwestern New Mexico have considerable scientific value, and some objects also have considerable cash value on the collectors' market. The damage done to archaeological sites in southwestern New Mexico by pot hunters and vandals is staggering. In projects such as the proposed power lines, ruins which were protected by their isolation often become accessible to the general public as a

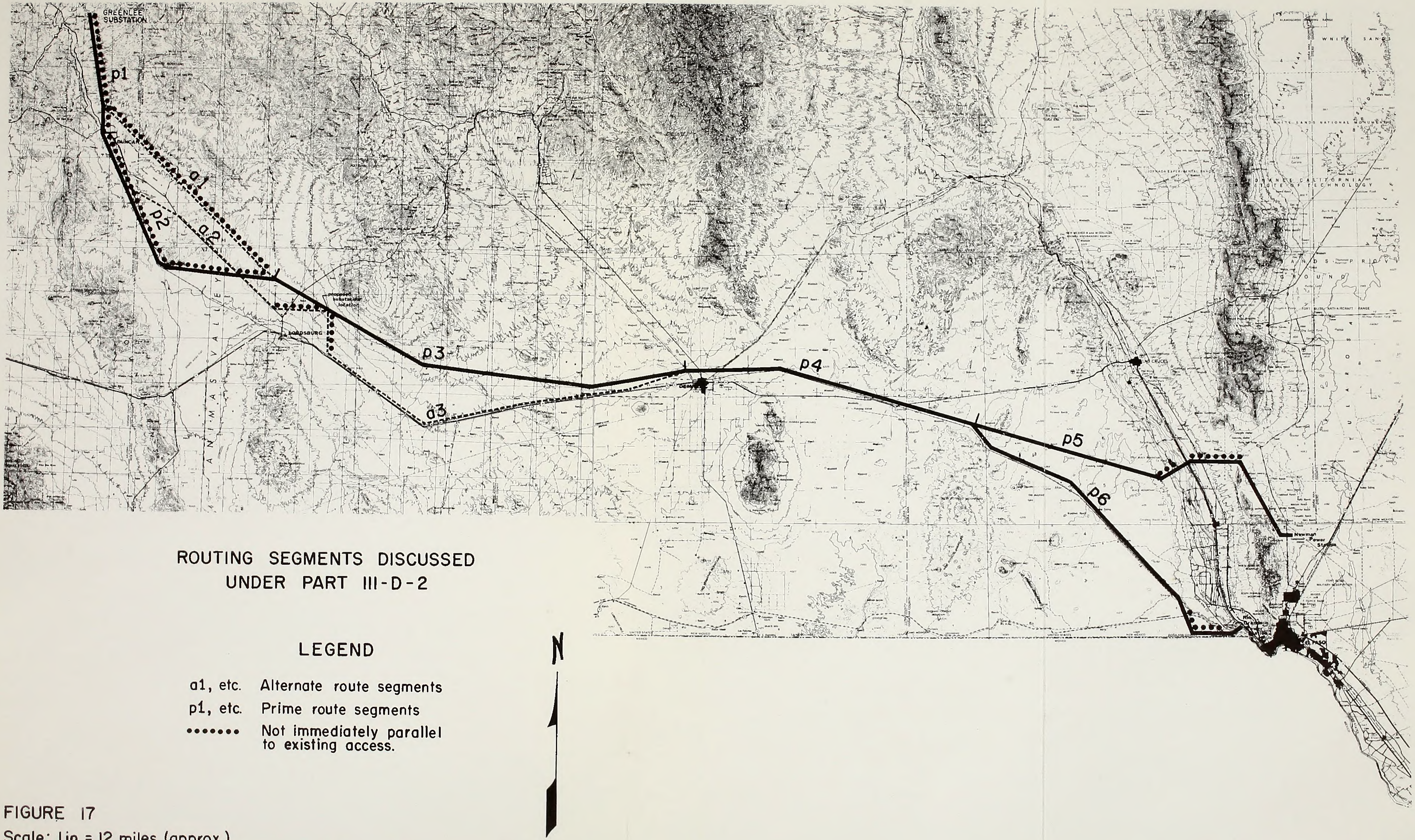
result of new road construction. Isolation is only limited protection from the persistent pot hunter but does protect sites from the casual vandal. New roads constructed along the Virden alternate would present the most significant impacts in this respect. New Mexico Environmental Institute's report indicates a 30 to 40 percent chance of encountering archaeological sites along this route. Known sites will be avoided in the proposed power line project. If other archaeological sites are discovered during construction, scientific salvage excavations will be undertaken.

2. Aesthetics

a. Impacts caused by road construction

The visual impact caused by roads depends on how the roads are constructed, the vegetative types along them, their alignment, and their proximity to areas of human habitation or activity. As most of the proposed routes follow existing roads, this potentially large impact generally associated with power line construction is greatly mitigated. However, there now are no roads along portions of segments p1, p2, and p5 of the prime route, and alternate routes a1 and a3. Only that segment from Interstate 10 north to the proposed substation near Lordsburg is roadless on a3 (Figure 17).

Roads built through creosote vegetative types seem to be much more noticeable than roads through other vegetative types in the



ROUTING SEGMENTS DISCUSSED
UNDER PART III-D-2

LEGEND

a1, etc.	Alternate route segments
p1, etc.	Prime route segments
•••••••	Not immediately parallel to existing access.

FIGURE 17
Scale: 1 in. = 12 miles (approx.)

project area. Creosote remains green throughout the year and contrasts sharply with the light colored soils exposed during clearing. Unless broken by the terrain or by irregular alignment, roads constructed through creosote remain quite distinct 2 or 3 miles away when viewed directly in line with the road. Frequent travel over these roads prevents creosote from reestablishing itself in the roadway. Consequently, the visual impact of the road may be prolonged indefinitely. Creosote will be encountered in almost all roadless segments but is particularly prevalent in segments p1, p2, p5, and a1.

Roads across grassland, while perhaps less noticeable due to the more subtle contrasts between soil and vegetation, seem to be more noticeable when viewed from a slight angle as compared to creosote. The higher vegetation found in creosote stands shields the road from side-view, while the lower grasses, shrubs, and forbs are not as effective in accomplishing this. However, because blading is not normally necessary across grasslands to permit access, the overall visual impact should be less in this vegetative type. In addition to creosote, grasslands are encountered in roadless portions of segments p2, a1, and a3.

Roads through mesquite types normally present less visual intrusion than either creosote or grassland. These roads normally meander through the mesquite clumps and are well concealed by the high vegetation. Mesquite is encountered in segments p2, p5, p6, and a1.

Any new roads built during construction operations would further detract from the appearance of the landscape.

b. Visual intrusion by the power lines

Once the lines have been constructed, impacts upon aesthetics are mostly limited to how objectionable the line is in relation to open space and scenic values.

Straight lines are not common in nature; the straight vertical poles, horizontal lines, and parallel alignment of the poles immediately catch the attention of travelers and register discord. Pole color may also present a contrast with surrounding natural colors. Silver reflective lines and dark-black creosoted poles stand out sharply against a light-colored background or skyline. However, regular conductors tend to dull in color and lose reflectiveness over time. The company will use pentatreated rather than creosote-treated poles. The surfaces of the pentatreated poles weather quickly, in approximately 6 months, and take on a lighter shade which is less intrusive than the darker creosote poles.

Following is a discussion of the visual impact of the power lines as proposed along each segment of the routes shown in Figure 17.

<u>The Prime Route</u>

Segment p1: The northern two-thirds of this segment will be entirely out of sight from Arizona Route 75. However, the power lines will be viewable from this highway by looking up some of the broader canyons in the southern part of the segment. The proposed points at which U.S. 70 and Arizona 75 will be crossed are considered advantageous with regard to concealment of the line.

Sharp bluffs located on one or both sides of these highways will greatly reduce the length of line visible at these locations.

Since a pipeline roughly parallels the transmission line route along the south half of this segment, the added intrusion of two parallel power lines is not as severe as would otherwise be the case. About half of the segment passes through an area rated scenic category B (Figure 15). The lines would be only a mild intrusion into the B-rated area since there are a few highly visible manmade developments already there. The impact of the lines on the visual setting at the Gila River crossing would also be moderate, since the river at that point is narrow and there are a number of power lines, pipelines, roads, and structures already in the vicinity. All considered, the power lines would have at least a moderate adverse impact on aesthetics along the entire length of this segment.

Segment p2: The western portion of this segment passes through an area with class C scenery over much of its length. Although the lines would be viewable from U.S. 70 between Franklin and Duncan, the Peloncillo Mountain piedmont affords a very good backdrop in this area, substantially reducing this impact. Six miles of the segment cut across a corner of the B-rated Lordsburg Mesa, crossing U.S. 70, New Mexico 464, and New Mexico 90 in this area. New Mexico 464 and New Mexico 90 would be crossed approximately 4 miles north of Lordsburg, while U.S. 70 would be crossed some 8 miles west of town, at least 4 miles past the area influenced by

manmade intrusion in and around the town itself. In the case of U.S. 70, the impact upon the scenic values now offered along this highway would be significant. Using a somewhat conservative distance of 2 miles from highway to power line to determine the length of highway impacted, the power lines would be viewable for 5½ miles along this highway (Figure 18). Approximately 26 miles of this highway continually pass through the B class scenery of Lordsburg Mesa.

That part of the segment from Summit to the Gila River crossing generally parallels the railroad. At places the lines would be nearly a mile from the railroad and would slightly impact country not previously disturbed by right-of-way corridors. Access roads would have to be built from the railroad, further disturbing the natural terrain.

Open space values in the Peloncillo Mountains would not be seriously impacted because of the lines' close proximity to the existing disturbance.

Segment p3: This segment between Lordsburg and Deming follows an existing pipeline most of the way. The route deviates from the pipeline 13 miles west of Deming in order to bypass the town and stay clear of Interstate 10. Since the power lines would follow an existing pipeline corridor, there would be a minimum of new ground disturbance caused by access roads. The line which

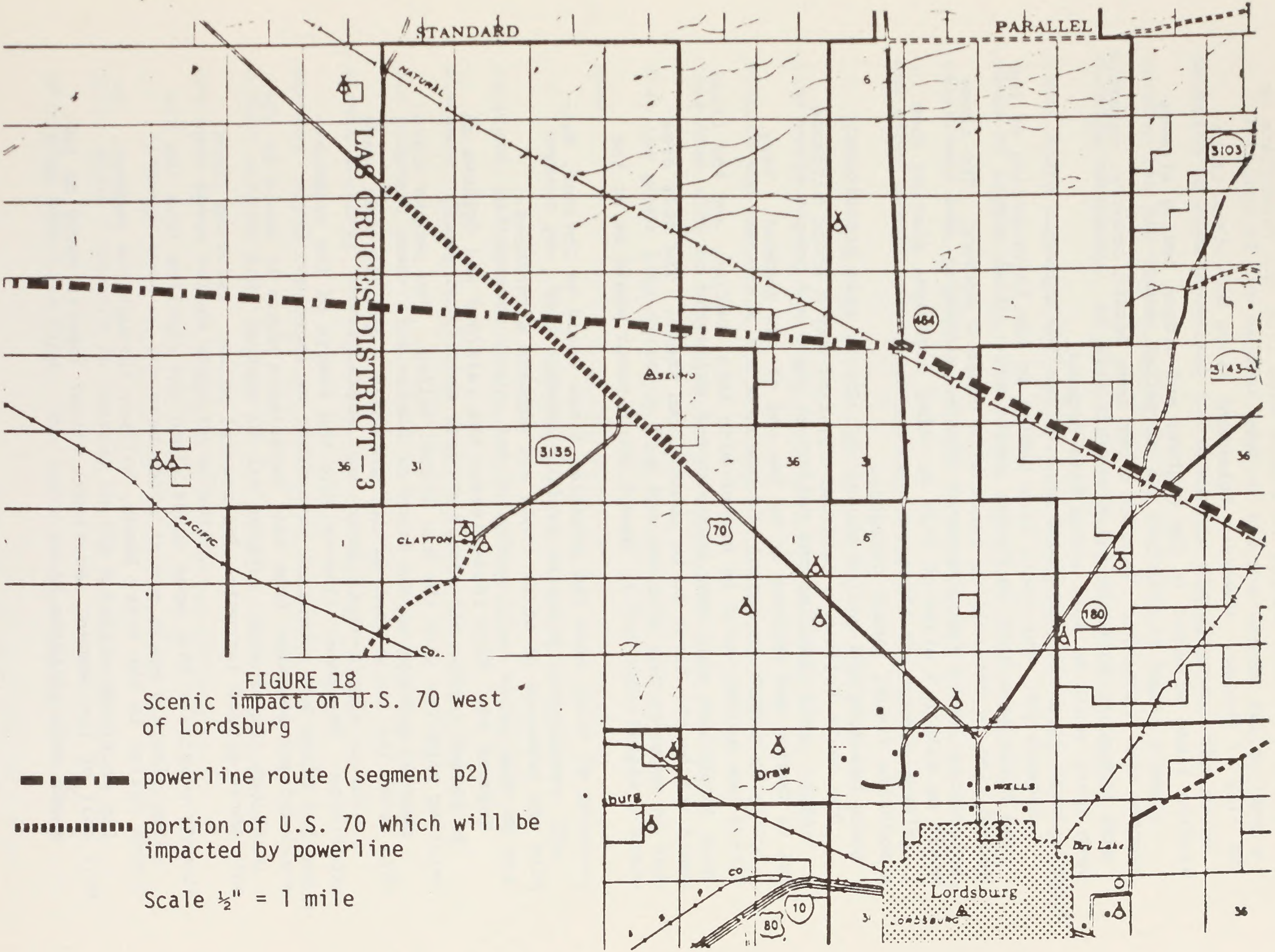


FIGURE 18
Scenic impact on U.S. 70 west of Lordsburg

powerline route (segment p2)

portion of U.S. 70 which will be impacted by powerline

Scale ½" = 1 mile

parallels I-10 near Deming is within view from the Interstate or the city of Deming. However, telephone lines and other transmission lines adjacent to the highway and around Deming already clutter the landscape. As with other open desert country, valuable open space would be lost along this segment.

Segment p4: The route from Deming to the intersection of the second line is entirely in lands with class C scenery. The lines would be within 3 miles of I-10 or other highways, placing them in a moderate visual impact category.

The route follows a railroad right-of-way a short distance out of Deming and follows it to the end of the segment. Very little new ground would be broken with this routing, and the lines would not be the first to be constructed there. The only area where a significant scenic impact would occur would be at the crossing of I-10; here the parallel lines would be obvious, despite the presence of other lines and manmade structures.

Segment p5: This route leaves the railroad and follows an existing pipeline into the Rio Grande Valley. Few people travel this area, but those that do can now enjoy a quality open space experience. The power line--single the length of the segment--would detract somewhat from that experience since it would be the only above ground intrusion for several miles. Existing lines already penetrate this open space along the pipeline from the Rio Grande Valley to the Perry Ranch, halfway through the segment. In this half of the segment additional visual impacts would be low.

Portions of the segment east of the Rio Grande Valley have a moderate to high potential for aesthetic disturbance. The route crosses the Rio Grande Valley in the vicinity of Vado, a small farming community. It also crosses a few miles of irrigated farm land, State Highways 487 and 28, and Interstate 10 which carries thousands of people daily. The visual impact on this area would be relatively low, primarily because numerous power lines, structures, and other scenic intrusions already downgrade the scenic quality.

Immediately east of the Rio Grande Valley the proposed power line would border the Organ Mountains Recreational Area. Individuals who now visit the area and the increased number of visitors that will be traveling the proposed west side road might find that the power line detracts from the solitude and openness of the area.

Segment p6: This segment follows existing intrusions: The railroad, maintenance roads, and telephone lines along most of the distance. These facilities would mitigate the visual impact of the proposed power line, since it would not be passing through virgin country. Nevertheless, the power line--single in this segment--would represent an additional intrusion and would influence a much greater area because of its height. Both scenic qualities and open space values would be affected.

Although most of the area falls in the class C scenic category, class B scenery is located in the Potrillo Mountains and adjoining Aden Lava Flow. The route would actually miss these

areas, passing just north of them, but would detract from their value as a scenic vantage point because the line would be visible from their interior portions. Again, the power line would simply expand the area already influenced by existing intrusions. Likewise, open space values in this area would be influenced, and consequently reduced, in the same way.

In the eastern end of this segment, the transmission line would impact the populated Rio Grande Valley in the same manner as described for segment p5. Just west of the valley, the impending development of the Santa Teresa residential community and the Anapra Port of Entry must be considered. However, it is again impossible to ascertain fully the impacts on these areas at this time due to incomplete information concerning their proposed development. It must be clearly understood, however, that the potentials for conflict between these proposed developments and the power line are very real, and that coordination must be accomplished prior to establishing the final route for the transmission line through this area.

Alternate Routes

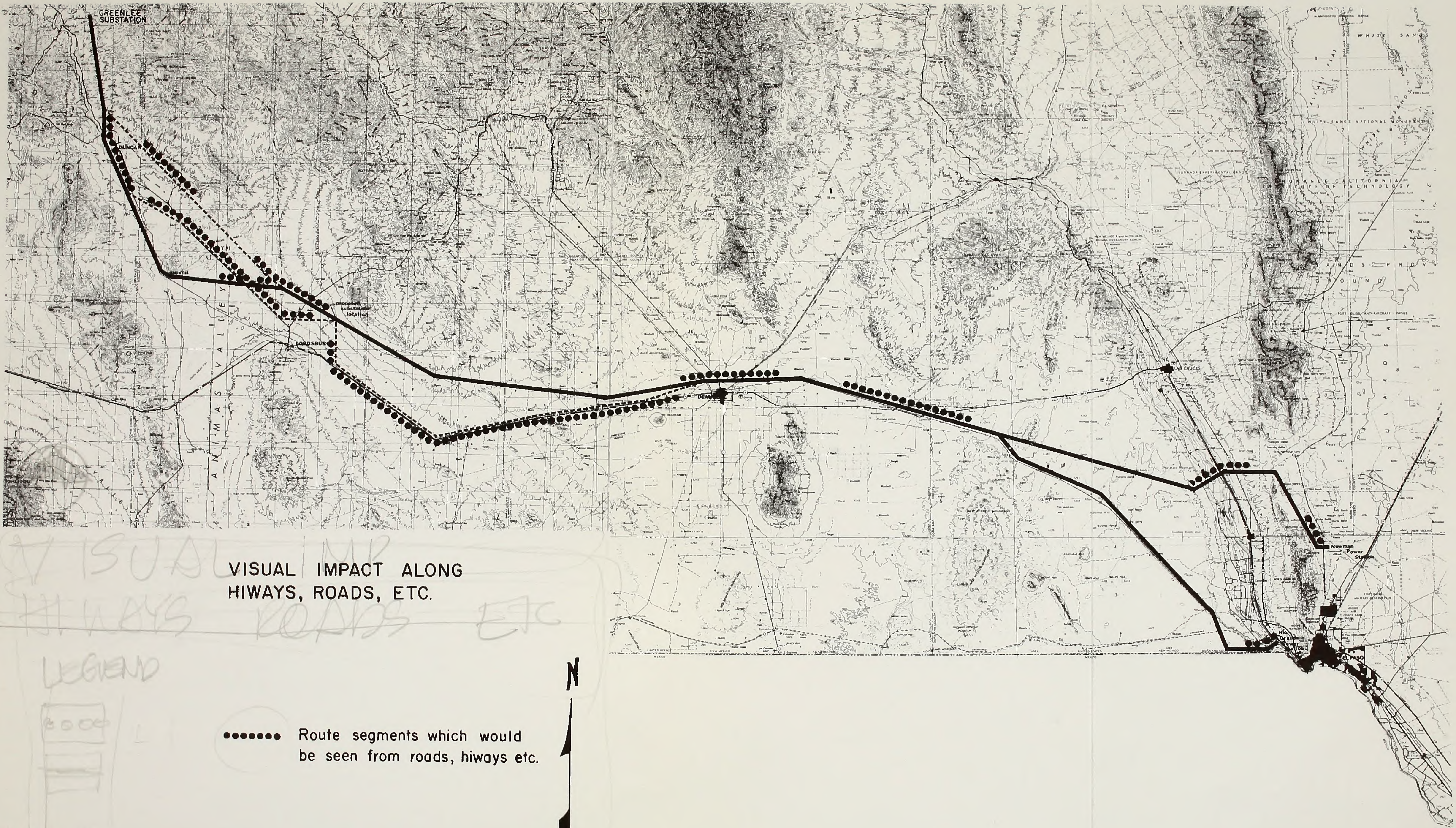
Segment a1, the Virden alternate: Much of this segment is in class B scenery and the route comes close enough to the lower box of the Gila River to impact the class A scenery there. The power lines would be the first major manmade intrusion through this area. In the vicinity of the lower box of the Gila River, the visual impact would be severe. In the class B areas, the scenic qualities would be significantly reduced.

This segment also passes through several miles of scenic category B lands north of the Virden Valley. This land has not previously been crossed by either a pipeline or power line corridor. The lines would be conspicuous to residents and travelers going through the Virden Valley, since the two lines would cross New Mexico 92 twice, pass within a mile of Virden, and cross several miles of farm land. The route would then enter the B-rated Lordsburg Mesa at a distance of 3 miles from U.S. 70. The lines through this area would not be particularly obvious from the highway; however, they would be a serious intrusion for anyone traveling to the Gila River along a secondary road and encountering the line in the middle of an otherwise open desert setting.

Segment a2, the U.S. 70 alternate: This segment would follow U.S. 70 between Lordsburg and Duncan and would be a major scenic intrusion. The only development along the highway now is a telephone line which serves local ranch houses. At the rate telephone lines are being placed underground, this rather insignificant intrusion will probably also be buried within a few years. Open space and scenic values are very high along this highway and would be lost or seriously depleted by the presence of the power lines.

Segment a3, the Interstate 10 alternate: This segment follows Interstate 10 between Deming and Lordsburg along the north side of the freeway. The entire length of this segment is lined with at least three telephone or power lines carrying 30 or more

individual wires. In addition, a railroad parallels the entire length to the Deming Pumping Station, where it deviates to bypass Deming. The additional intrusion caused by an added pair of power lines would have the impact of making an undesirable situation worse. The added lines and poles would be visible, though not as objectionable as would be the case if no lines previously existed. It is possible that some of the existing telephone lines will some day be placed underground or removed entirely to improve the scenery or for commercial reasons. If this were to happen, the proposed lines would become more prominent, and to some people, objectionable. On the other hand, if the Southern Pacific Railroad were to become electrified as has been considered, twin power lines down the railroad would eliminate the impact of lengthy feeder lines every 40 miles (Figure 19).



VISUAL IMP
~~HIWAYS ROADS ETC~~
LEGEND

VISUAL IMPACT ALONG
HIWAYS, ROADS, ETC.

●●●●●●● Route segments which would be seen from roads, hiways etc.

FIGURE 19
Scale: 1 in. = 12 miles (approx.)

IV. Mitigating Measures Included in the Proposed Action

Since the companies had not surveyed the proposed route prior to contacting the BLM, other land administrators, and the land owners concerned, much routing flexibility resulted. This permitted consideration of a number of routing possibilities before selection of those analyzed here. Once these routes were selected, there was opportunity to make refinements in their locations and alignments to take advantage of topography and existing access; to avoid recreation, residential, scenic, open space values; and to adjust for other environmental considerations. Thus, many potential impacts have been avoided which, if the line had been surveyed in advance, would have required mitigation through negotiation and perhaps costly resurvey by the company. However, many potential impacts remain to be mitigated. This will be accomplished through BLM policies and regulations, company policies, stipulations included in the grant of right-of-way, and through liaison and compliance checks between the company and BLM representatives. The following documents will help quide BLM inspectors to assure proper procedures are followed.

Appendix C - The Easement for Right-of-Way for Electrical Power Transmission Lines

Appendix D - Regulations Pertaining to the Issuance and Compliance of Rights-of-Way

Appendix E - The Companies' Construction Policy

The actual preparation of a set of stipulations must await the selection and survey of the final routes. However, to help ensure that all environmental components are considered, and that related impacts are mitigated to the greatest extent possible, this impact statement will provide a procedural framework to be followed by the Bureau of Land Management for the preparation and enforcement of stipulations. Although this impact statement considers impacts upon all lands along the proposed routes, the BLM can assume responsibility for implementing the following procedures only on lands under its administration.

1. Before a grant of easement is authorized across NRL an archaeological clearance survey will be required along the surveyed alignment. Changes in alignment and/or tower locations may be required to avoid damaging archaeological values.

2. The BLM will fully field review the surveyed alignment to determine the need for any adjustments in alignment or tower locations and to identify all areas which require specific stipulations to mitigate expected impacts. Surveyed station numbers will be used in these stipulations to identify the precise areas to which they apply.

3. The following guidelines will be used when considering mitigation measures necessary to protect the various environmental components:

(a) Topography

Whenever possible, trunk and spur roads will be routed through areas where excavation and/or fill are not necessary to acquire grades which will allow the passage of construction vehicles and equipment.

(b) Soils

To limit soil compaction and excessive surface disturbance, restrictions will be placed on the types and size of equipment allowed for clearing operations. Both companies normally employ one or more bulldozers for road building and assembly pad clearing. Surface disturbance will be greatly reduced by using equipment with rubber tires where necessary. A road grader will perform most of the clearing across creosote and other areas where a "front end dozer" --a bulldozer with a blade on front--is unnecessary. This type of equipment, when properly used, will accomplish the necessary clearing with minimal disturbance to both soil and vegetation. In those areas where terrain or larger vegetation species make it necessary to use a "front end dozer," smaller equipment or possibly rubber-tired bulldozers will be considered. The BLM will analyze the specific routes and tower sites and determine the proper restrictions on the use of particular equipment. These specific measures will be discussed with the companies at pre-construction conferences. Use of helicopters will be considered in the critical area from the Greenlee substation south to the Gila River crossing when suitable access cannot otherwise be found.

In the areas requiring crossing of soil types known to compact readily when wet, restrictions will be imposed on construction operations during wet weather periods.

On all disturbed areas, water bars and/or other runoff control structures will be spaced at the following maximum distances, depending on the slope:

Slopes of 1% or less	-	400 ft.
Slopes of 1% to 5%	-	300 ft.
Slopes of 5% to 15%	-	200 ft.
Slopes of 15% to 25%	-	100 ft.
Slopes greater than 25%	-	50 ft. or less.

These distances between bars or structures are maximum distances and may be reduced where soil conditions warrant, as determined by the appropriate BLM official.

Maximum use of existing access will be required. In those areas where existing access does not parallel the power line routes, BLM will meet with the company to agree upon the best alternative access available in the area to minimize the need for construction of new access to the greatest extent practicable.

Soil sterilants will be prohibited from use on lands administered by the BLM.

(c) Hydrology

To the extent possible, roads will be located and constructed in a manner to avoid significant changes in runoff patterns. During field review of the surveyed line, particular

attention will be paid to avoiding alterations of runoff patterns which may adversely affect those vegetal communities which are dependent upon seasonal flooding.

(d) Land Use

(1) Crop production - The BLM has no authority to implement restrictions or to provide stipulations governing activities on private lands located in the subject area.

(2) Livestock production - "Blade up" operation will be required on the areas which permit vehicular access without the need for vegetal clearing. The line will be located and/or stipulations provided to prevent disturbance of livestock movement, watering, and grazing during construction operations.

(3) Residential use - Although the BLM has no regulatory authority on private land, some mitigation of potential impacts upon residential areas can be accomplished when right-of-way is sought across public lands lying close to, or adjoining, residential areas. An example would be to reroute a right-of-way across public land to avoid visual intrusion or economic impact upon neighboring residential communities. Such an opportunity presents itself in the cases of the Anapra Port of Entry and the Santa Teresa residential community west of El Paso, Texas. The BLM will assume responsibility to coordinate the location of the transmission line to avoid impact upon these areas prior to issuance of the right-of-way.

(4) Military use - The BLM has no authority over military lands.

(5) Industrial activities - Concerning the probability of industrial development in the Anapra area, the BLM assumes responsibility for coordinating the alignment of the transmission line on Federal lands in that area to avoid conflict with plans for industrial development.

(6) Recreation uses - That portion of the proposed route for the first line which lies between the Franklin Mountains and Interstate 10 will be located as far south as possible to mitigate impacts upon the Organ Mountain recreation lands.

(7) Public utilities - Provisions are contained under 43 CFR, Part 2851.1-1 which require the applicant for a power transmission line right-of-way to prevent interference with, or damage to, other public utilities and communication equipment in existence at the time the right-of-way is authorized.

(8) Railroads - Possible interference with railroad communication and signal equipment will be analyzed the length of the route, with consultation from appropriate railroad officials, and appropriate measures taken to eliminate such interference.

(e) Flora

Restrictions will be placed on the types of equipment allowed for use in vegetal clearing operations. For example, a road grader can clear vegetation without doing as much damage as

a bulldozer. Use of road graders or other rubber tired equipment will be required where appropriate.

During field review of the surveyed line, areas where no vegetative clearing is necessary will be identified by survey station numbers. "Blade up" operations will be stipulated for such areas.

Special attention will be paid to avoiding changes in runoff pattern which might adversely affect vegetal communities dependent upon seasonal flooding.

Herbicides and soil sterilants will be prohibited from use on NRL.

A qualified expert's opinion will be solicited prior to construction to determine the likelihood of occurrence of Endangered and Threatened Plant Species along the route. A survey of the actual staked line will be conducted if necessary and further mitigating measures applied as necessary.

Vegetative disturbance will be held to minimum. Where climatic conditions permit reseeding and/or other cultural treatments will be accomplished. This determination is to be made by the land management agency.

(f) Fauna

Stipulations which provide protection for soils and vegetation will likewise benefit animal species and habitats found in the area.

A stipulation prohibiting the willfull destruction of all plant and animal species by construction crews will be included. The protected species will include Gila Monsters, hawks, eagles, owls, vultures, ravens and crows.

Design of the transmission line towers is such that electrocution danger to large birds of prey is already mitigated.

(g) Ecological Interrelationships

Stipulations which provide protection for soils, vegetation, and animals will likewise mitigate impacts upon ecological interrelationships.

(h) Human Interest Values

1. Archaeology - In addition to the required archaeological survey, stipulations will be included in the grant of right-of-way which provide protection from vandalism, restrict unauthorized excavation, and require that salvage excavations be performed by a qualified archaeologist on any archaeological sites in danger of destruction during construction operations.

Sites located as a result of the archaeological survey will be evaluated as to their significance as called for in the "National Historic Preservation Act." Any cultural properties found eligible for inclusion on the National Register of Historic Places will be handled in accordance with Sec. 106 of the above mentioned act.

2. Aesthetics

A great deal of effort has been made to accomplish the most aesthetically suitable routing alignments prior to

actual survey of the transmission line routes. Care has been taken to use existing access as much as possible, to use topography to backdrop or shield the line from view, and to avoid areas of high open space and scenic values. These efforts, in conjunction with stipulations providing for the protection of soil, topography, and vegetation will satisfactorily mitigate most anticipated aesthetic impacts.

3. The company shall remove or dispose of all waste in a manner consistent with all Federal and State laws.

4. The BLM will monitor construction of the transmission lines across national resource lands to ensure compliance with the terms and conditions of the right-of-way.

5. The companies shall designate field representatives (liaisons) whose responsibility it will be to communicate with an authorized representative of the BLM, and to receive and comply with all communications and decisions of the BLM.

6. The BLM will reserve the right to require rehabilitation of all areas considered overly or unnecessarily disturbed during construction operations.

7. Prior to beginning construction, a preconstruction conference will be held between the BLM and the companies to discuss and clarify all stipulations, terms, and conditions to the grant of right-of-way.

V. Adverse Impacts That Cannot be Avoided

A. Non-Living Components

1. Topography

The construction of roads and structural assembly pads in the rougher terrain, particularly in the western portions of the route, will unavoidably result in localized changes to the land surface.

2. Soils

Stripping of vegetation, blading of the soils' surface, and travel across the land by various types of vehicles will unavoidably alter the soil structure, either permanently or temporarily depending on the nature of the disturbance, and allow accelerated erosion to occur for a number of years after construction. These impacts would largely cease or be corrected within 5 to 10 years.

3. Hydrology

Some change in runoff patterns is unavoidable due to road construction. Water quality could be adversely impacted by soil erosion, however, there is no data available to quantify this. Otherwise, there are few or no unavoidable impacts upon the surface and subsurface water resources in the study area.

4. Land Use

a. Major Land Uses

(1) Crop Production

Since a definite right-of-way across the Rio Grande and Gila River Valleys has not been acquired, the exact

amount of crop land which will be crossed cannot be determined. However, crossing of some crop land will be unavoidable, particularly in the Rio Grande Valley near Vado, New Mexico. At the utmost, a total of 3.7 miles of crop land would be crossed along the prime route (i.e., 3.2 miles in the Rio Grande Valley plus 0.5 miles at the Gila River crossing). If the Virden alternate was used, a total of 5.7 miles of crop land could be crossed (i.e., 3.2 miles in the Rio Grande Valley plus 2.5 miles in the Virden Valley).

Once constructed, the presence of transmission lines through agricultural areas would unavoidably increase the hazard of operating crop dusting planes and, to a lesser extent, other farm equipment.

(2) Livestock Production

A relatively small amount of forage will be temporarily lost through construction activities. Overall carrying capacities of the ranch units, however, will not be affected.

(3) Residential Use

Information gathered during the preparation of this impact statement indicates that no appreciable loss of value on residential properties will result. However, residential development within the right-of-way will be precluded for the life of the transmission lines.

(4) Military Use

There are no unavoidable impacts associated with this land use in the subject area.

(5) Industrial Activities

There are no unavoidable impacts associated with this activity in the subject area.

(6) Recreational Uses

Even when above ground power transmission lines are placed adjacent to existing facilities, they adversely affect scenic qualities in the eyes of certain people. When they are installed in areas where no transmission lines currently exist, the scenic value is impaired for a great many more people, regardless of the relative scenic value of the land through which the proposed lines pass. This is especially true in recent years with people having become more aware of environmental factors. Therefore, the value of most recreational experiences now available along the proposed routes would unavoidably be adversely impacted by the mere presence of the line. The reader should make the distinction between recreational experience and recreational activity. As used here, experience refers to the enjoyment the recreationists gain from their particular activity. In activities such as sightseeing and photography, where unspoiled landscapes are important, power lines constitute an intrusion and may detract from the enjoyment. Otherwise, recreational activities themselves will not be affected.

(7) Public Utilities

Given proper coordination between the companies involved, no unavoidable adverse impacts to public utilities such as pipelines, telephone lines, and other transmission lines will occur. However, even with thorough grounding there is likely to be occasional interference with radio and television signals in certain areas. Such interference will occur only within a zone 500 feet wide on each side of the right-of-way.

B. Living Components

1. Flora

Vegetation in the following areas will unavoidably be damaged or destroyed by construction activities: All structural assembly pads; areas along the extreme east and west portions of the route where there are no parallel roads; and the areas along spur roads leading from existing access to structural assembly pads. The impact upon vegetation resulting from the construction of trunk roads in the extreme eastern and western portions of the routes will probably continue indefinitely due to periodic traffic over these roads by other users of the land where travel restrictions are found not feasible. Table, 14 presents an estimate of the maximum acreage of vegetation which could be either destroyed or disturbed during construction operations along each route:

Table 14 SURFACE DISTURBANCE BY ROUTE

	Trunk Roads	Structural Assembly Pads	Spur Roads	Totals
Prime Route	105	190	160	455 acres
U.S. 70 Alternate	60	170	143	373 acres
Virden Alternate	96	185	155	436 acres

Table 14 is merely an estimate of acreage and does not reflect the difference in the degree of disturbance expected to result from variations in vegetation and terrain along each route. This impact is largely unavoidable. Additional roads created by off-road vehicles in these areas should also be considered an unavoidable impact until more effective controls become available.

2. Fauna

In all areas where vegetation is destroyed or significantly damaged, wildlife habitats will likewise be destroyed or altered until natural revegetation takes place. In these areas, a number of small wildlife species will be destroyed or dislocated from their present nests and burrows. The most important wildlife habitat near the routes, a 6 mile section along the Gila River east of the Virden Valley, is situated close enough to the Virden alternate to be impacted if the transmission lines use that route.

C. Ecological Interrelationships

Some change in prey-predator relationships will result from the towers' providing new perching and nesting sites for birds of prey. However, due to the varied vegetation types and animal population these changes cannot be significantly quantified. The change in the ecological balance may produce an adverse impact.

Altered soil conditions due to surface disturbance, compaction, and erosion may render them incapable of supporting certain vegetative species now found there. At least temporary damage to this biotic-abiotic relationship will be unavoidable.

D. Human Interest Values

1. Archaeology

Regardless of the intensity of archaeological inventory, the thoroughness of enforcement of stipulations, and the past construction controls against vandalism, the possibility of damage to archaeological sites may not be totally eliminated.

2. Aesthetics

The most significant unavoidable adverse impacts associated with power lines frequently involve aesthetics. Although a number of factors have been considered in determining a routing which will best avoid aesthetic impacts, the physical presence of the towers and lines will inevitably detract from aesthetic settings. The scars from construction activities will remain on the land for many years in some areas.

VI. Relationship Between Short-Term Use and Long-Term Productivity

For purposes of this analysis the life span of the transmission lines is considered to be 50 years. Fifty years is therefore the short-term period of use, while long-term productivity refers to the productive capacity of the affected area after the 50-year life span of the project.

With the possible exception of soils, none of the non-living components will lose long-term productivity as a result of the power lines. As discussed in part III, soils may be modified in certain areas to the degree that they are no longer capable of supporting the same species and densities of vegetation now found there. In these cases, related resources such as flora, fauna, and aesthetics will also be affected.

In the case of flora and fauna, reduction of long-term productivity will be extremely minor or even non-existent. However, long-term aesthetic values may be significantly reduced through scarring of the landscape by construction, operation, and--if it should occur--removal of the transmission lines during the short-term period. Probably more detrimental than these activities will be the continued use of disturbed areas by other visitors to the subject lands. This type of use can be expected to continue during much of the short-term period and may extend well into the long-term period, depending upon the initiation and effectiveness of regulatory factors.

Archaeological investigations prior to construction increase the information available to scientists concerning the history and prehistory of the project area. Inventory and mitigation studies resulting from the proposed action accelerate the rate at which archaeologists can identify the cultural history of the project area.

All considered, short-term uses of the right-of-way have very little impact upon the long-term productivity of the right-of-way or other areas influenced by the transmission lines.

VII. Irreversible and Irretrievable Commitments of Resources

Very few irreversible and irretrievable commitments of resources have been identified. The major impact is a commitment of space for land use as a transmission corridor. However, this use is a short-term use which is compatible with many other land resource uses and is not considered irreversible and irretrievable.

Intrusion of manmade structures, including towers, will change the basic character of some of the land from a natural wild area to that of an area which is marked by human use. Those segments of the corridor which are essentially wild will be subject to increased human activity. Although the entire length of the corridor is now accessible, the more remote areas are subject to a low level of human activity because few roads exist. Construction of the transmission lines will have an irreversible negative effect upon the natural beauty of the wild areas, as well as on their general character. Even if the structures are eventually removed, the scars of human use will have irreversibly marked the area.

There is no evidence to indicate that the increased level of human activity would have an irreversible effect upon any of the flora or fauna of the area. There will be some soil disturbances, but none of such a consequence that the disturbance can be considered irreversible or irretrievable.

The resources used as actual construction components will be largely irretrievable except for a limited salvage value. All support costs for the project such as fuels, other petroleum products, and equipment are considered an irretrievable commitment of resources. Since cultural resources are a nonrenewable resource their exploitation through salvage as a result of the proposed action constitutes an irreversible and irretrievable commitment. Similarly, the destruction of cultural resource values incidental to the proposed action are irreversible.

The primary commitment of resources was the decision to proceed with power generation and distribution from the San Juan Generating Station (Bureau of Reclamation, 1973). The 345 KV transmission lines transport power from the San Juan Generating Station to the Vail substation near Tucson, Arizona.

VIII. Alternatives to the Proposed Action

A. Alternate Routes

Preceding sections of this impact statement have examined three alternate routes in addition to the proposed prime route: The Virden alternate; the U. S. 70 alternate, and the Interstate 10 alternate between Deming and Lordsburg. Significant differences in the degree of impact upon the various environmental components have been identified. Table 15 summarizes these differences which based upon information contained in this statement, indicates the route or routes believed most advantageous in reducing or eliminating various types of environmental impacts. This Table is intended only to summarize previous discussions and should not be considered conclusive regarding the best route to follow. All previous information must be thoroughly reviewed before arriving at this decision.

B. Other Alternatives

1. No Transmission Line

El Paso Electric Company states that the proposed power lines are "required to meet the need for large blocks of additional firm power which will be required within the company's service area for the period 1976 to 1985 and to insure reliable, uninterrupted service." Given the anticipated power requirements within the next decade, failure to construct the proposed lines would mean that those needs could be met only by construction of new electric generating plants and/or conversion of existing

Table 15

Comparative Impacts of Prime and Alternate Routes

	Routes West of Lordsburg			Routes Between Deming & Lordsburg	
	Prime Route	U. S. 70 Alternate	Virden Alternate	Prime Route	Interstate 10 Alternate
Topography	X	X			
Climate					
Geology					
Soils		X			
Hydrology	X	X			
Land Use					
Land Ownership	X	X			
Crop Production	X	X			
Livestock Production		X			
Residential Use	X	X			
Military Use					
Industrial Activities					
Recreational Uses	X				
Designated Recreational Lands					
Other Recreational Lands	X				
Recreational Developments				X	
Public Utilities				X	
Flora		X			
Fauna		X			X
Ecological Interrelationships	X	X			
Archaeology	X				
Aesthetics	X			X	

X indicates the route or routes which would best reduce or eliminate impacts upon the particular environmental component. Absence of an X across from a given component indicates that impacts on that component are equal for all routes or that no impact would occur. (No measurable difference between routes)

plants to other fuel sources. Considering the time frame of the projected needs, the most feasible alternatives along that line appear to be the construction of nuclear generating plants and conversion of existing power plants to coal. Environmental impacts related to such actions, along with other technical considerations, were discussed in Energy Alternatives: A Comparative Analysis prepared for the Council on Environmental Quality and other Government offices by the Science and Public Policy Program, University of Oklahoma, Norman, Oklahoma (1975).

Although other energy sources such as solar, nuclear fusion, and geothermal energy represent possible solutions in the future, they cannot be considered viable alternatives if the projected needs are to be met within the time frame specified. Of these, geothermal energy may be a viable source of future electrical energy for the project area. (See Other Power Sources, p. 184.)

2. Use or Upgrade Existing Transmission Lines

An alternative to use or upgrade existing transmission lines was considered, however, there are no transmission lines in the area which could be upgraded and used to accomplish these objectives.

3. Undergrounding

This method of energy transmission would still require use of one of the corridors discussed earlier. Undergrounding is being widely utilized for low voltage urban distribution systems and for short distances in critical or highly

sensitive areas. Technology in this field has not yet progressed to the point where extra high voltage underground facilities can reasonably compete economically with overhead lines. In a Study for the Electric Research Council, consultants Arthur D. Little, Inc., found that the average cost of undergrounding high voltage transmission lines is about 20 to 30 times that of installing surface lines. During the recent preparation of the draft environmental statement (DES 74-7) for the El Sol to Vail, Arizona 345 KV transmission line, Tucson Gas and Electric Company submitted the following comments regarding undergrounding:

"With the present state of technology, underground 345 KV transmission lines could be run a distance of approximately 20 miles before a reactor station would be required to correct the power factor. This means that approximately ten shunt reactor substations would be needed ...

Oil impregnated paper insulation is used for low power 345 KV underground transmission lines, whereas pressured oil would be required to carry the power of the proposed line. With temperature conditions and the low thermal conductivity of soil types encountered along the proposed right-of-way, circulated pressurized oil with cooling might be necessary to attain the emergency rating of the line. To place the proposed transmission line underground, oil pressurization stations (possibly with circulation and cooling) would be required at intervals of approximately

10 miles (i.e., a pressurization station at every shunt reactor station and one between reactor stations).

Both pressurization stations and reactor stations require periodic maintenance. Consequently, service roads would be required to each station. Both stations and roads would cause environmental impact.

In addition to the initial cost, undergrounding this line would involve higher maintenance costs. With 100 percent shunt reactor compensation at every reactor station, the power lost in transmission would exceed 10 percent of the power on the line at the point where undergrounding starts .... There would be a continuous point-to-point interruption of the ground in undergrounding, as opposed to an intermittent interruption of the ground in installing towers ...."

Undergrounding high voltage transmission lines is often proposed as a means of mitigating impacts on scenic and open space resources. While this may be accomplished to some degree, impacts on other resources and environmental components often offset any aesthetic advantage that might be gained. The impact caused by excavating the trench necessary to accommodate the system and the construction of parallel roads needed for maintenance is a serious problem, particularly in the arid country along the proposed route. The right-of-way would have to be cleared along the entire

route to permit trench construction and to allow the installation of the underground transmission lines, cooling system, and other appurtenances. Over some of the route, bedding material would have to be excavated from other locations, not only impacting the excavated area but also resulting in a need to leave the displaced material either heaped along the route or disposed of elsewhere. Soil erosion would be severe because of the extensive disturbance, the need to trench straight up hills, and the slow recovery of vegetation on the disturbed soil profile. The above ground appurtenances such as pumping stations would result in aesthetic intrusions.

4. Use of Double Circuit Towers

The obvious appeal of double-circuit towers is the narrower right-of-way which could accommodate two parallel lines. A minimum right-of-way of 300 to 330 feet is required for two separate parallel lines, while double-circuiting could be accommodated within a 250 foot right-of-way.

The anticipated tradeoffs in environmental impacts and reliability are as follows: Total right-of-way width may not be as important environmentally as the area actually used. The huge four-legged steel towers required for double-circuiting would take up more physical space. Each leg would require more base area than each leg of the two-legged single circuit wooden towers as proposed. The lattice designed double-circuit towers present a

much greater visual mass. They would be nearly 60 feet higher and about 35 feet wider than the single-circuit towers. In addition, higher standard access roads would probably be required for construction of double-circuit towers. This would result in more overall surface disturbance and more difficult rehabilitation work.

The reliability of power delivery would suffer with double-circuit towers. Lightning tripouts on a double-circuit tower would create an increased number of power outages compared to two separated towers. The larger mass and height may also attract more lightning strikes. At present, a double-circuit free-standing tower cannot be designed to withstand as much wind as a single-circuit tower without a tremendous increase in structural mass.

5. <u>Direct Current Alternative</u>

Direct current alternatives have no environmental disadvantages when compared to alternating current. However, if the DC transmission system were selected, it would necessitate the construction of at least four AC - DC converter stations to obtain similar system reliability and flexibility in shunting current. Future power taps would also require AC - DC converter stations. Early design decisions by southwestern utilities for power transmission were for AC. This early decision causes a strong economic disadvantage for the use of DC transmission at this time.

6. Other Power Sources

As stated earlier, present fuel sources in El Paso, i.e. fuel oil and natural gas, are expected to become increasingly scarce in the near future. Therefore, these cannot be considered reliable alternate sources of power. However, there is the possibility that geothermal energy may be available in certain areas of south-central New Mexico. One such area occurs just northwest of El Paso in the area of Kilbourne Hole, the Potrillo Mountains, and the Aden Lava Flows. This area, if found to provide sufficient geothermal energy, could perhaps meet future electrical requirements for El Paso and southwestern New Mexico.

The probability of economically feasible geothermal energy being developed in this area is difficult to state at this time because of the limited information available. There are no shows of hot water or steam at the surface. However, this could be due to the dry climate and/or the deep water table in this area. Hot water (+100°F) has been discovered in two deep wells. Although this indicates geothermal potential, the probability of development is still far below that of such areas as Salton Sea in California or the Baca location in north-central New Mexico.

As demonstrated by the geothermal generating plants at the Geysers, California, geothermal steam can provide very substantial energy once developed. It has been estimated that the Geysers geothermal field will be producing 700 MW by 1976. This area, however, has been under development for almost 20 years.

If geothermal steam is to be considered a viable alternate source of energy, it must be capable of meeting the projected electricity demands within the indicated time frame. The first geothermal leases in the area were issued on NRL in mid-1975. These leases have not been sufficiently explored to date to determine the commercial geothermal steam prospects. Even if usable geothermal energy had been discovered in 1975, electrical generation could not have been expected before 1980. Even then, it is probable that the generating capacity would have been well below the power requirements of El Paso Electric by that time. It is, therefore, safe to say that this potential energy source does not constitute a reasonable alternative for meeting the projected energy demands and timetables as stated by El Paso Electric and Public Service Company of New Mexico. It does, however, represent a possible future source of energy in this area. If developed in the near future, the electrical energy produced at this site could be distributed to El Paso and southwestern New Mexico across the lines proposed in this impact statement. It could also represent another generating source which could tie into the transmission line network discussed earlier and further improve the intended reliability factor.

Geothermal power plants have their own environmental impact considerations. A 100 MW electricity-generating plant using

geothermal energy requires from 3,000 to 5,000 acres of land, with 7 to 10 percent of the area directly used for facilities. The Energy Alternatives study cited earlier reports possible impacts from the following: Air pollution, especially hydrogen sulfide, which in some cases exceeds air pollution from fossil-fueled plants burning high sulfur fuel; water pollution, with the need to treat wastewater; thermal pollution, especially where more than one plant is involved; noise pollution; land subsidence resulting from removal of fluids, and generation of seismic activity touched off by ground-fluid changes.

IX. Consultation and Coordination with Others

A. Public Participation and Consultation

The Draft Environmental Statement was prepared by Bureau of Land Management personnel in New Mexico. Prior to and during preparation of the draft, considerable public participation was sought.

In April 1974, public news releases were issued to over 25 newspapers, radio, and television stations in New Mexico, Arizona, and Texas. This news release indicated that the Bureau of Land Management was embarking on the EIS and asked for interest and involvement.

In addition, numerous letters were sent out during the early months of 1974 to Federal, State, and local entities having involvement or jurisdiction relating to the proposed line. Interested or affected individuals or companies were also contacted by letter and in person. These early news releases and letters resulted in further consultation and coordination throughout the development of the EIS.

The company contracted with the New Mexico Environmental Institute, (NMEI), to prepare an environmental assessment report. At BLM's request, the routes surveyed and analyzed by NMEI were expanded to include additional routes suggested by BLM.

Numerous responses to letters which went out in February and March of 1974 were received. Some of the more significant comments and input is as follows:

The Soil Conservation Service responded from the State Conservationist and several Area Offices. They provided suggestions and advice on routing, particularly in the Virden Valley. They also provided information relating to land ownership and future potential land uses. Major concern was in the Virden Valley and near the town of Duncan, Arizona. BLM's proposed routing alignment was adjusted to avoid, as far as possible, potential conflicts.

The town of Duncan expressed concern over possible conflicts with their proposed air strip expansion and a proposed new school site. The proposed route was selected to avoid these conflicts.

The Southwest New Mexico Council of Governments has worked closely with BLM on the project.

The U. S. Fish and Wildlife Service sent three different responses concerning the project. These comments related to bird electrocution and the fact that the proposed line apparently would not unduly impact wildlife.

The U. S. Forest Service responded that no national forest lands were involved, but that the Gila National Forest would study the proposal since the line would pass close to that forest.

Several State Agencies were contacted such as N. M. State Planning Office, N. M. Department of Game and Fish, and N. M. State Land Office. No specific input was received from the state agencies.

BLM personnel participated in the public hearing before the New Mexico Public Service Commission in August, 1974. These public hearings are required for all proposed high voltage transmission lines.

The BLM field team which analyzed the routes held several consultations with potentially affected parties. Route location problems relating to paralleling the existing railroad and natural gas pipelines were worked out with company officials. Certain proposed routing changes were made. Other routing adjustments particularly near towns were made after discussions with local officials.

The appropriate State Historic Preservation Officers were contacted and consulted.

B. <u>Distribution List for Draft Environmental Statement</u>

U. S. Government

Senator Pete Domenici, New Mexico
Senator Joseph Montoya, New Mexico
Representative Manual Lujan, New Mexico
Representative Harold Runnels, New Mexico
Senator Lloyd Bentsen, Texas
Senator John Tower, Texas
Bureau of Outdoor Recreation
Bureau of Reclamation
Bureau of Mines
Fish and Wild Service
Geological Survey
Forest Service
Soil Conservation Service
Department of Health, Education and Welfare
Department of Housing and Urban Development
Department of Transportation
Commanding General, Ft. Bliss, Texas
Environmental Protection Agency
Energy Research and Development Administration
Federal Power Commission
Advisory Council on Historic Preservation

New Mexico State Government

Governor of New Mexico
New Mexico State Department of Game and Fish
New Mexico State Highway Department
New Mexico State Environmental Improvement Agency
New Mexico Public Service Commission
New Mexico State Planning Office
New Mexico State Land Office
Museum of New Mexico
Southwestern New Mexico Council of Governments
New Mexico State Environmental Institute

New Mexico County and City Governments

Board of Supervisors, Grant County, New Mexico
County Commission, Hidalgo County, New Mexico
Planning Commission, Luna County, New Mexico
City Manager, City of Deming, New Mexico
Mayor, City of Lordsburg, New Mexico

Arizona State Government

Governor of Arizona
Arizona State Game and Fish Department
Arizona State Highway Department

Arizona State Land Department
Arizona Parks and Recreation Association
Arizona State Siting Committee
Arizona State Clearinghouse
Arizona State Museum

Arizona County and City Governments

Board of Supervisors, Graham County, Arizona
Board of Supervisors, Greenlee County, Arizona
Mayor, City of Duncan, Arizona

Texas State Government

Governor of Texas

Texas County and City Governments

Mayor, City of El Paso, Texas

Private Organizations

Advisory Commission on Arizona Environment
Arizona Conservation Council
Arizonans in Defense of the Environment, Inc.
Arizona Wildlife Association
Community Public Service Company
El Paso Electric Company
El Paso Natural Gas Company
Environmental Council of Arizona
Izaak Walton League
National Wildlife Federation
New Mexico Central Clearing House
New Mexico Conservation Coordinating Council
Public Service Company of New Mexico
Sierra Club
Southern Arizona Environmental Council
Southern Pacific Pipeline Company
Southern Pacific Transportation Company
Southwestern New Mexico Audubon Society
The Wilderness Society

C. Summary of Correspondance Received Following Review of the Draft Statement

The Draft Environmental Statement was circulated for review of the data presented and comment on the adequacy of the environmental analysis. A total of 31 letters were received. Of these, twelve made comments which required responses. All correspondence received is printed in the following pages.

Correspondence which provided additional data or raised questions concerning the adequacy of the draft statement are followed by a response page or pages providing our response or the method of addressing the comment. Those letters which required no response are presented first. Comments are numbered in consecutive order on each letter as are the corresponding responses.

In some cases, more than one person made a comment concerning the same subject. Where this happened, the response consists of a referral to another response.

D. Summary of Changes From Draft Statement

Minor editorial and factual changes have been incorporated into this statement without acknowledgement in this section. Significant changes are summarized below.

Many commentors thought the maps were of poor quality and that one composite map was needed. The first map (Figure 6) has been replaced with a simple area map showing the proposed routing of the Southwestern New Mexico Transmission Project, and the major railroads and underground pipelines in the area.

A Glossary was prepared and is included immediately following the Appendices.

The subjects of ORV use and revegetation have been addressed in the statement.

An additional alternative, Direct Current, was addressed and discussed.

The archaeology section has been completely revised and updated. An appendix concerning the archaeological survey that was completed has been added. The appropriate State Historic Preservation Officers were consulted concerning the proposed route and the effect it might have on properties included in or eligible for inclusion in the National Register of Historic Places.

COMMENTS AND RESPONSES

United States Department of the Interior
BUREAU OF OUTDOOR RECREATION

SOUTH CENTRAL REGIONAL OFFICE
PATIO PLAZA, 5000 MARBLE N.E., ROOM 211
ALBUQUERQUE, NEW MEXICO 87110

IN REPLY REFER TO:

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XNM22986

STATE
SANTA FE, NEW MEXICO

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Mr. Arthur W. Zimmerman
State Director
Bureau of Land Management
P.O. Box 1449
Santa Fe, New Mexico 87501

Dear Mr. Zimmerman:

This is our response to the Draft Environmental Impact Statement prepared on the Greenlee County, Arizona, to El Paso, Texas, 345 KV Transmission Lines.

We find the recreation aspects of this project adequately addressed and have no substantive comments to offer.

We recommend, however, that the Bureau of Indian Affairs and the Advisory Council on Historic Preservation be provided the opportunity to review and comment on the statement.

Sincerely yours,

Rolland B. Handley

Rolland B. Handley
Regional Director

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

-1-

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103

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Mr. Arthur W. Zimmerman
State Director
U.S. Department of Interior
Bureau of Land Management
P.O. Box 1449
Santa Fe, New Mexico 87501

Dear Mr. Zimmerman:

The Draft Environmental Statement concerning construction of 345 KV transmission lines from Greenlee County, Arizona, to El Paso, Texas, has been reviewed as requested in your letter of February 19, 1976. The plan evaluated in the statement would not conflict with any existing or contemplated work of the Corps of Engineers. Environmental impacts related to the Corps' area of responsibility and expertise are adequately described in the statement.

Sincerely yours,

J H Coombes

JASPER H. COOMBES, P.E.
Chief, Engineering Division

-2-

AMERICAN REVOLUTION BICENTENNIAL
1776-1976

EMORANDUM

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
OFFICE OF THE REGIONAL DIRECTOR
DALLAS REGIONAL OFFICE

: United States Department of Interior
State Director
Bureau of Land Management
P.O. Box 1449
Santa Fe, New Mexico 87501

DATE: March 3, 1976

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STATE OFFICE
SANTA FE, NEW MEXICO

: Regional Environmental Officer
Region VI

CT: Environmental Impact Statement #EI 0176-664
Greenlee County, Arizona to El Paso, Texas
345 KV Transmission Lines

Pursuant to your request, we have reviewed the Environmental Impact Statement for the above project proposal in accordance with Section 102(2)(C) of P.L. 91-190, and the Council on Environmental Quality Guidelines of April 23, 1971.

Environmental health program responsibilities and standards of the Department of Health, Education, and Welfare include those vested with the United States Public Health Service and the Facilities Engineering and Construction Agency. The U.S. Public Health Service has those programs of the Federal Food and Drug Administration, which include the National Institute of Occupational Safety and Health and the Bureau of Community Environmental Management (housing, injury control, recreational health and insect and rodent control).

Accordingly, our review of the Draft Environmental Statement for the project discerns no adverse effects that might be of significance where our program responsibilities and standards pertain, provided that appropriate guides are followed in concert with State, County, and local environmental health laws and regulations.

We therefore have no objection to the authorization of this project insofar as our interests and responsibilities are concerned.

Date Routed MAR 11 1976

D. Dean Blue

D. Dean Blue, P. E.
Facilities Engineering and
Construction

Info

Other

4

DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

Reaction Review and Comments on Environmental Impact Statement for Project Proposal:

Draft Environmental Impact Statement Reviewed with Objections [ ]

Draft Environmental Impact Statement Reviewed with No Objections [X]

Date: March 5, 1976 EI#: 0176-664

Agency/Bureau: DHEW/PHS

Project Proposal: Greenlee County, Arizona to El Paso, Texas
345 KV Transmission Lines

Comments:

ARIZONA
STATE
PARKS

1688 WEST ADAMS STREET
PHOENIX, ARIZONA 85007
TELEPHONE 602-271-4174

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STATE OFFICE
SANTA FE, NEW MEX

March 25, 1976

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State Director
Bureau of Land Management
P.O. Box 1449
Santa Fe, N.M. 85701

Re: Greenlee to El Paso 345KV Line

Dear Sir:

Arizona State Parks has no plans, present or future, for recreational sites within the area of your study.

Thank you for the opportunity to comment on your project.

Sincerely,

Michael A. Ramnes
Acting Director

Allen W. Gross

Allen W. Gross
Recreational Planner

AWG:ag

8

STATE OF NEW MEXICO

Environmental Improvement Agency

HEALTH SAFETY WELLBEING COMFORT

March 29, 1976

P.O. Box 2348 - Room 215
Santa Fe, New Mexico

Date Routed APR 1 1976

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Mr. Arthur Zimmerman, State Director
Bureau of Land Management
P.O. Box 1449
Santa Fe, New Mexico 87503

THRU: Ms. Graciela Olivarez, State Planning Officer, State Clearinghouse
Room 403, Executive/Legislative Bldg., Santa Fe, New Mexico

Dear Mr. Zimmerman:

We have reviewed the draft environmental statement for the proposed transmission line (354 KV.) extending from Greenlee County, Arizona to El Paso, Texas.

The statement fairly addresses environmental parameters as they relate to alternative routes. We previously have taken the position that consideration should be given to the alternative which closely parallels the railroad right of way. Our reasoning for this was:

1. Should future fuel problems arise relating to diesel supplies, it may be feasible to utilize electricity generated from coal or nuclear plants.

2. Lesser environmental problems are usually presented when existing right of ways are utilized.

This draft addresses both of these points.

We offer the following correction: page 85, last sentence, the smelter referred to is at Hurley, New Mexico. We know of no Peru smelter.

Thank you for the opportunity to comment.

Sincerely,

Thomas Baca

for Aaron L. Bond, Director
Environmental Improvement Agency

11

UNITED STATES DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

Box 2007, Albuquerque, NM 87103

March 30, 1976

'76 APR 1 AM 9:41

SANTA FE, NEW MEXICO

Mr. Arthur W. Zimmerman
Bureau of Land Management
P. O. Box 1449
Santa Fe, NM 87501

Dear Mr. Zimmerman:

We received your draft environmental statement prepared on the Greenlee County, Arizona, to El Paso, Texas, 345 KV Transmission Lines for our review and comment.

We have no substantive comment.

Thank you for the opportunity to review this statement.

Sincerely,

A W Hamelstrom

A. W. Hamelstrom
State Conservationist

Date Routed APR 1 1976

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12

El Paso NATURAL GAS COMPANY

P. O. BOX 1492
EL PASO, TEXAS 79978
PHONE 915-543-2600

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Date Routed APR 5 1976

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April 1, 1976

Mr. Authur W. Zimmerman
State Director
Bureau of Land Management
P. O. Box 1449
Santa Fe, New Mexico 87501

Re: R/W 741327 and R/W 74856
Encroachment: Public
Service Company of
New Mexico and El Paso
Electric Company
2 345 KV Power Lines
Various Facilities
Various Counties, New Mexico

Your Re: 1972(911)
XNM22986

Dear Mr. Zimmerman:

Thank you for your letter dated February 19, 1976 and Environmental Impact Statement concerning the captioned project.

We have reviewed the Environmental Impact Statement and find that it adequately states the recommendations of El Paso Natural Gas Company in connection with the construction of the 345 KV power lines from Greenlee County, Arizona to El Paso County, Texas.

Very truly yours,

Wayne C. Stephens

Wayne C. Stephens
Manager
Controls Division
Right of Way Department

DH/la

14

Date Routed APR 5 1976

SD ... Info

ASD

Action

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI
1600 PATTERSON
DALLAS, TEXAS 75201

April 1, 1976

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Other

'76 APR 5 AM 9:20

OFFICE
SANTA FE, NEW MEXICO

Mr. Arthur W. Zimmerman
State Director
Department of the Interior
Bureau of Land Management
P. O. Box 1449
Santa Fe, New Mexico 87501

Dear Mr. Zimmerman:

We have reviewed the Draft Environmental Impact Statement for the construction of two 345 KV transmission lines from the Greenlee Switching Station in Greenlee County, Arizona, across southwestern New Mexico to El Paso, Texas. The project will require a single right-of-way approximately 300 feet in width for approximately 158 miles from the western end. This will divide into two separate rights-of-way, each approximately 150 feet wide, at the El Paso end. The two narrower rights-of-way will each approximate 46 miles in length. The completed lines will total approximately 250 miles from southeastern Arizona to two substations in El Paso.

We classify your Draft Environmental Impact Statement as LO-1. Specifically, we have no objections to the project as it relates to EPA's legislative mandates. The statement contained sufficient information to adequately evaluate the possible environmental impacts which could result from project implementation. The classification and the date of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions under Section 309 of the Clean Air Act.

Definitions of the categories are provided on the attachment. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and on the adequacy of the impact statement at the draft stage, whenever possible.

We appreciate the opportunity to review the Draft Environmental Impact Statement. Please send us two (2) copies of the Final Environmental Impact Statement at the same time it is sent to the Council on Environmental Quality.

Sincerely yours,

for John C. White
Regional Administrator

Attachment

17

ENVIRONMENTAL IMPACT OF THE ACTION

LO - Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

ER - Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to re-assess these aspects..

EU - Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

ADEQUACY OF THE IMPACT STATEMENT

Category 1 - Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

Category 2 - Insufficient Information

EPA believes the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

Category 3 - Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement. If a draft statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

ARIZONA DEPARTMENT OF TRANSPORTATION

HIGHWAYS DIVISION

RAUL H. CASTRO
Governor

206 South Seventeenth Avenue Phoenix, Arizona 85007

WILLIAM A. ORDWAY
Director

WILLIAM N. PRICE
State Engineer

'76 APR 5 AM 9:32

April 1, 1976

Date Routed APR 5 1976

Info

Action

Other

Mr. Ralph Kingery
Arizona State Clearinghouse
Office of Economic Planning
and Development
1624 West Adams, Room 300
Phoenix, AZ 85007

Re: 345 KV Transmission Lines
Greenlee County, Arizona to
El Paso, Texas - DES 76-6
Bureau of Land Management
State Identifier: 76-80-0009

Dear Mr. Kingery:

The Environmental Planning Services, in coordination with the Utility and Railroad Engineering Services of the Highways Division, Arizona Department of Transportation, has reviewed the Draft Environmental Statement, 345 KV Transmission Lines, Greenlee County, Arizona to El Paso, Texas, submitted by the Department of Interior Bureau of Land Management.

We note the prime route will cross U.S. Route 70 and U.S. Route 666 but should pose no significant adverse impact upon Arizona Department of Transportation interests.

It is recommended that the transmission line support towers be located at least 100 feet from the highway right of way boundary line to permit future highway upgrading, drainage improvements, etc. The highline clearance over the highway should be in accordance with applicable National transmission line safety standards and we note this is adequately covered in the Draft Environmental Statement.

The Arizona Department of Transportation does have several highway construction projects scheduled in the Arizona Five-Year Transportation Construction Program which appear to be in the vicinity of the proposed power line corridor. The attached extracts from our Five-Year Construction Program show the locations of these projects and they are as follows:

19

Project Number	Project Location	Milepost	Length	Start Construction
RF-051-2(15)	Jct. U.S. 70-Tollgate Wash	131.0	7.97	FY 1975-76
RF-051-2(16)	M.P. 139-Greenlee Co. Unit I	139.0	2.70	FY 1976-77
RF-051-2(17)	M.P. 139-Greenlee Co. Unit II	141.7	2.60	FY 1977-78
RF-051-2(18)	Graham Co. Ln.-M.P. 149	144.1	4.90	FY 1979-80
RF-051-2(19)	M.P. 149-Three Way	149.0	5.50	FY 1978-79
RF-051-2(3)	Three Way-Smelter Hill	154.6	5.45	FY 1977-78

Type of Work: Upgrade existing roadway to a 40-foot-wide roadway with grade, drain and asphaltic concrete pavement.

Easement permits to cross the State Highway System may be obtained through Mr. Dennis Ambrose, Maintenance and Encroachment Engineer, Arizona Department of Transportation, Highways Division, Maintenance Section, Room 111, 206 South 17th Avenue, Phoenix, Arizona 85007. Coordination should also be maintained with the Arizona Department of Transportation in regard to scheduling and traffic control when work is to be accomplished in the impact area.

We appreciate the opportunity to review and comment on this Draft Environmental Statement and if we may be of further assistance, please let us know.

Yours very truly,

WM. N. PRICE
State Engineer

James E. Dorre

For MASON J. TOLES, Manager
Environmental Planning Services

MJT/ADG/cm

Attachment

cc: Mr. Arthur W. Zimmerman ✓
State Director
U.S. Department of Interior
Bureau of Land Management
New Mexico State
Post Office Box 1449
Santa Fe, New Mexico 87501

Utility and Railroad Engineering Services
District III

STATE OF NEW MEXICO

STATE PLANNING OFFICE

EXECUTIVE — LEGISLATIVE BUILDING
SANTA FE 87503

Date Routed ....
MS
CF
Other

GRACIELA (GRACE) OLIVAREZ
STATE PLANNING OFFICER

JERRY APODACA
GOVERNOR

ROBERT S. LANDMANN
DEPUTY STATE PLANNING OFFICER

April 1, 1976

State Director
Bureau of Land Management
P.O. Box 1449
Santa Fe, New Mexico 87501

Dear Sir:

We have reviewed the Environmental Impact Statement, Greenlee County, Arizona to El Paso, Texas 345 KV Transmission Lines, and offer the following comments:

First, we do not question the basic need for extending the transmission line network from the Four Corners generating complex to meet projected power demands of southwestern New Mexico (the Southwest New Mexico Transmission Project).

Second, we feel your "procedural framework" to bring this about is realistic. Details regarding unavoidable and adverse impacts are to the point. The mitigating measures included in your proposed action bear out adequately.

Regarding right-of-way, your considerations of short-term (50 years) relative to long-term productivity, as influenced by the transmission lines, is positive.

The no-change in ownership of land due to the granting of term easements with renewal provisions across federal and state lands (page 134), is desirable.

The pre-construction conference between the Bureau of Land Management and the companies, to discuss right-of-ways, is noted; at the same time we assume this to be routine procedure reflecting the high standards of the Bureau of Land Management requirements.

20

In conculsion, we feel that the benefits derived from the proposed project outweigh anticipated detrimental effects of this endeavor.

If you have any questions, please feel free to contact us.

Sincerely,

Eve Taggart

Eve Taggart
Division of Natural Resources

ET:anne

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VIRGINIA 22092

APR 9 1976

76 APR 9 AM 9:25

Date Routed APR 6 1976

SD Info ✓
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Other

DES 76-6

Memorandum

To: State Director, Bureau of Land Management
Santa Fe, New Mexico

From: Chief, Environmental Impact Analysis Program

Subject: Review of draft environmental statement for 345 KV transmission lines from Greenlee County, Arizona to El Paso, Texas

This memorandum is to confirm our telephone call of March 26 stating that the Geological Survey has no comment on the subject draft environmental statement.

Daniel B. Krinsley
Daniel B. Krinsley

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

OFFICE OF THE DIRECTOR

United States Department of the Interior

BUREAU OF MINES
2401 E STREET, NW.
WASHINGTON, D.C. 20241

SANTA FE, NEW MEXICO

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Other

April 7, 1976

DES 76-6

Memorandum

To: State Director, Bureau of Land Management, Santa Fe, New Mexico

Through: Deputy Assistant Secretary--Energy and Minerals Rolland R. Reid

APR 12 1976

From: Director, Bureau of Mines

Subject: Draft environmental statement, Bureau of Land Management, proposed 345 kV transmission lines, Greenlee County, Arizona to El Paso, Texas

The Bureau of Mines Intermountain Field Operation Center, Denver, has reviewed your draft environmental statement on the application by the El Paso Electric Company and the Public Service Company of New Mexico for the necessary rights-of-way required to permit construction of 250 miles of 2-line, 345 kV transmission system between the Greenlee substation in southeastern Arizona and El Paso, Texas.

The proposed transmission line corridors bypass the known base and precious metal mineralized areas in the region and should pose no conflict with this facet of the mineral sector. In the El Paso area, the corridors will traverse the Las Cruces basin, an identified target area for future oil and gas exploration. However, the 300-foot right-of-way should not preclude their future exploration and development. Dedication of the right-of-way may preclude development of common variety minerals, e.g., stone and sand and gravel, in the corridors, but these resources are relatively abundant in the region and the project should pose no curtailment of supply. Since right-of-way planning has been coordinated with El Paso Natural Gas Company, which operates pipeline installations in the region, and because legal requirements specify prevention of interference between existing and proposed public utility facilities, we believe potential conflicts will be minimized.

We believe that construction and operation of the transmission lines along the proposed corridors will pose no significant adverse impact on the mineral sector, and have no objections to the project as planned. The draft environmental statement adequately covers the mineral-related facets of the proposed project.

AMERICAN REVOLUTION BICENTENNIAL

Thank you for the opportunity to review this draft.

Director

APR 1 5 1976

Date Routed

Catron

Grant

Luna

Hidalgo

Other

SOUTHWEST NEW MEXICO COUNCIL OF GOVERNMENTS

P. O. BOX 2157
211½ N. BULLARD
SILVER CITY, N.M. 88061
388-1974

DATE 3-22-76

TO: State Director
Bureau of Land Management
Box 1449
Santa Fe, N.M. 87501

FROM: SOUTHWEST NEW MEXICO COUNCIL OF GOVERNMENTS
EXECUTIVE COMMITTEE

SUBJECT: A-95/Environmental Review
Project # 109 SAI#
Title 345KV Power Transmission Line

This letter indicates our concurrence in the favorable review given the above mentioned project by the Technical Review Committee of the SWNM COG.

The pertinent comments were duly adopted at our Executive Committee meeting held 3-22, 1976 at Silver City.

Very truly yours,

D. Vaut a/f

Chairman, SWNM COG

JWH/DER/ss

Encl

26

DATE 3-17-76

TO: CHAIRMAN, MEMBERS SWNM COG

FROM: CHAIRMAN, TECHNICAL REVIEW COMMITTEE

SUBJECT: A-95, Environmental Review

PROJECT # 109

TITLE 345KV Power Transmission- Bureau of Land Management

The attached A-95/Environmental Review was received by the Technical Review Committee at their meeting held 3-17-76, at the Council of Governments Office in Silver City.

The favorable comments were adopted and recommended to the Southwest New Mexico Council of Governments for approval and submission to the appropriate agency.

Respectfully submitted,

Henry Davis

Henry Davis
Chairman,
Technical Review Committee

APR 7 REC'D

March 29, 1976

To: Chairman, Technical Review Committee

From: L.T. Putman

Subject: Review of Project #109-E 15 propossed 345KV Power transmission line - Dona Ana County, New Mexico to Greenlee County, Arizona- Bureau of Land Management

The project submitted by the Bureau of Land Management on the above named transmission line coincides with the previous study done by the New Mexico Environmental Institute. I recommend that the Technical Review Committee support this study.

Yours truly,

L. T. Putman

L.T. Putman,
Member - T.R.C.

MDR/sam

APR 1 REC'D

Advisory Council
On Historic Preservation
1522 K Street N.W.
Washington, D.C. 20005

Date Routed APR 14 1976

Info

Action

'76 APR 14 AM 8 57

SANTA FE, NEW MEXICO

April 8, 1976

Other

Mr. Arthur W. Zimmerman
State Director
Bureau of Land Management
P. O. Box 1449
Santa Fe, New Mexico 87501

Dear Mr. Zimmerman:

This is in response to your request of March 19, 1976 for comments on the draft environmental statement (DES) for the Greenlee County, Arizona to El Paso, Texas 345 KV Transmission Lines. The Advisory Council has reviewed the DES and has subsequently discussed the project with staff to the Arizona, New Mexico and Texas State Historic Preservation Officers (SHPO). Based on our review and those discussions, it appears that the project as currently planned will not effect known properties included in or eligible for inclusion in the National Register of Historic Places.

However, we also note that the Bureau of Land Management (BLM) recognizes the need for additional cultural surveys once rights-of-way alignments have been selected. Accordingly, BLM is reminded should these further studies identify previously unknown cultural resources which cannot be avoided during project construction, they should be evaluated in consultation with the appropriate SHPO, and if subsequently determined eligible for inclusion in the National Register by the Secretary of the Interior, BLM must afford the Council an opportunity to comment in accordance with the "Procedures for the Protection of Historic and Cultural Properties" (36 C.F.R. Part 800), which sets forth the steps for compliance with Section 106 of the National Historic Preservation Act of 1966 and Executive Order 11593, "Protection and Enhancement of the Cultural Environment" issued May 13, 1971, prior to taking any action, including archeological salvage, which will affect the cultural resource.

Should you have questions or require additional assistance in this matter, please contact Michael H. Bureman at (FTS) 234-4946. Your

27

continued cooperation is appreciated.

Sincerely yours,

Louis S. Wall
Assistant Director, Office
of Review and Compliance

WEST TEXAS
COUNCIL OF
GOVERNMENTS

1200 NORTH MESA ○ EL PASO, TEXAS 79902 (915) 544-3827

E. RAY HILL
Executive Director

MAY 10 1976

May 6, 1976

FAX MES NM No. '76 330
5/12/76 To NM 3

CF
Other

SANTA FE

Mr. Dennis Earhart
Bureau of Land Management
P. O. Box 1449
Santa Fe, New Mexico 87501

Re: GA-76-56 - Dated: Apr. 26, 1976
Proposed Transmission Lines -
Ariaona to El Paso, Texas

Dear Mr. Earhart:

Pursuant to the provisions of OMB Circular A-95, the Government Applications Review and Comment Committee will meet to review the above referenced project on Thursday, May 13, 1976, at 8:30 A.M., at the address listed below:

Conference Room
West Texas Council of Governments
1200 North Mesa
El Paso, Texas 79902

In order that the GARC Committee can make a thorough and reasonable review of your project, we would like to invite you or your representative to attend this meeting to present your proposal and answer any questions that may arise.

The GARC Committee is a technical advisory committee which makes recommendations to the Board of Directors for formal action. The Board of Directors is composed primarily of elected officials of the West Texas region and has final authority in the issuance of official comments of the West Texas Council of Governments.

The Board will meet to consider your project at 10:00 A.M., on May 21, 1976, at the Downtown Holiday Inn, 17th Floor. Your attendance at this meeting is also requested.

Please advise me whether you will be able to attend either or both of these meetings.

Sincerely,

George Zapalac

George Zapalac
Asst. Director
Physical Resources Planning

GZ/bg

30

WEST TEXAS
COUNCIL OF
GOVERNMENTS

1200 NORTH MESA ○ EL PASO, TEXAS 79902 (915) 544-3827

E. RAY HILL
Executive Director

Date Routed MAY 24 1976

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2 CF
Other

May 21, 1976

Mr. Dennis Earhart
Bureau of Land Management
State Office
P. O. Box 1449
Santa Fe, New Mexico 87501

Re: 1972 (911) - XM 22986A
Application GA-76-56
Proposed Transmission Lines
Draft Environmental Statement

Dear Mr. Earhart:

In accordance with OMB Circular A-95, and the National Environmental Policy Act of 1969, the above-captioned draft engironmental statement has been reviewed by the Government Applications Review and Comment Committee (May 13, 1976), and by the Board of Directors of the West Texas Council of Governments (May 21, 1976).

Favorable comment was given to the report on the basis that no serious adverse environmental impacts are likely to result.

Sincerely,

Bruce Gaines

Bruce Gaines, Director
Physical Resources Planning

BG/bg

cc: Harry Zimmer,
El Paso Electric Co.
Al Schutz, Governor's Budget
and Planning Office

31

PC5

United States Department of the Interior

NATIONAL PARK SERVICE
SOUTHWEST REGION
P.O. Box 728
Santa Fe, New Mexico 87501

Date Routed MAR 19 1976

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'76 MAR 19 AM 10 07
STATE OFFICE
SANTA FE, NEW MEXICO

IN REPLY REFER TO:
L7619 (SWR) PSE

MAR 18 1976

Memorandum

To: State Director, Bureau of Land Management, Santa Fe, New Mexico

From: Regional Director, Southwest Region

Subject: Review of Bureau of Land Management draft environmental statement for the proposed Greenlee County, Arizona to El Paso, Texas 345 KV Transmission Lines (DES-76/6)
Due: April 3, 1976

The statement is inadequate in that it fails to provide substantive information regarding project impact upon archeological and historical resources, and thus allows neither an assessment of these aspects of the project itself nor of the alternatives described in the statement.

The statement does not indicate that the National Register of Historic Places has been consulted. The final statement should include evidence of consultation and discuss the nature of any effects upon listed properties. 1

The final statement should also include evidence of consultation with the State Historic Preservation Officer and include any comments he may furnish regarding the effect of the project upon properties either listed or in the process of nomination to the National Register of Historic Places.

Page 106, D. 1. Archeology, Sentence 3

There is no indication of who performed the archeological study of the Arizona portion or how it was done. This information should be included in the final statement. 2

6

Page 106, Sentence 5

Justification should be offered in the final statement for the conclusion that neither of the two archeological sites along the Arizona segment merit nomination to the National Register. 3

Page 182 (h) (1) Archeology

The required archeological survey mentioned should be an intensive survey conducted by a professional archeologist to cover the entire right-of-way and all other areas where ground disturbance will occur such as construction roads and camps, access roads, storage areas, disposal sites and borrow areas. The stipulations in the grant of right-of-way to provide protection from vandalism and to restrict unauthorized excavation should be detailed in the final statement. 4

Page 192, Section VII

There is no mention of cultural resources in this section. The effects of this project upon cultural resources could be adverse, cumulative and irreversible and, therefore, should be discussed in the final statement. 5

Response to Comments from National Park Service

1. Most of the archaeology section has been revised and updated. All required individuals have been contacted. Refer to the letter from the Advisory Council On Historic Preservation.

2. The survey in Arizona was completed by the Department of Sociology and Anthropology, New Mexico State University.

3. This conclusion was based on the analysis of individual sites by NMSU and a review by the BLM, Cultural Resource Specialist.

4. This is standard BLM operating procedures.

5. Text has been changed.

Date Routed MAR 24 1976

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RECEIVED ... MGMT.
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... OFFICE
SANTA FE, NEW MEXICO

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
REGION SIX

117 U. S. Court House
Santa Fe, New Mexico 87501

March 23, 1976

IN REPLY REFER TO 06-35.10A

Mr. Arthur W. Zimmerman
State Director
Bureau of Land Management
P.O. Box 1449
Santa Fe, New Mexico 87501

Subject: Draft Environmental Impact Statement
Greenlee County, Arizona to El Paso, Texas
345 KV Transmission Lines

Dear Mr. Zimmerman:

We have reviewed the subject draft EIS and have no adverse comments. However, we feel that the final EIS should enter into more detail on methods of reseeding, soil stabilants etc. to be used to minimize erosion problems associated with denuded areas especially the construction access roadways. 6

Sincerely yours,

for: John F. MacAllister
Division Administrator

cc: Office of the Secretary of Transportation (1)
Mr. Ed Foreman, Secretary's Representative-Dallas (1)
C.E.Q. (5)
Region (1)

7

Response to Comment from U. S. Department of Transportation

See responses to City of El Paso comments. These subjects are discussed in a general manner in the statement since
6. there are such varied soils and vegetation along the proposed route. Mitigation concerning revegetation must be site-specific.

DEPARTMENT OF THE ARMY
HEADQUARTERS US ARMY AIR DEFENSE CENTER AND FORT BLISS
FORT BLISS, TEXAS 79916

ATZC-FEE

'76 MAR 29 PM 3:39

NEW MEXICO

Date Routed MAR 30 1976

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Mr. Art Zimmerman
State Director
Bureau of Land Management
US Post Office and Federal Building
P. O. Box 1449
Santa Fe, New Mexico 87501

Dear Mr. Zimmerman:

This command has reviewed the Draft Environmental Impact Statement on the 345 KV transmission lines from Greenlee County, Arizona to El Paso, Texas. This command concurs with the environmental impact statement provided that the proposed power lines right of way, through Fort Bliss land, is located parallel to and southwest of the existing power line that traverses the extreme southwest corner of Dona Ana Range and Maneuver Area 3B.

Sincerely,

WILLIAM A. ANDERSON
Colonel, Corps of Engineers
Director of Facilities Engineering

9

Response to Comment from Department of the Army,
Fort Bliss, Texas

7. The powerline, if built, will parallel the existing power line.

Bicentennial Council

El Paso

The International City

'76 APR 1 AM 8:51

SANTA FE, NEW MEXICO

Date Routed APR 1 1976

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DON HENDERSON
MAYOR

NESTOR A. VALENCIA
EXECUTIVE ASSISTANT

E. H. BAEZA
MAYOR PRO TEM

ARLENE S. QUENON

RICHARD A. NAJERA

DR. J. B. JONES

ROBERT H. GABEL
ADMINISTRATIVE OFFICER

W. L. RIEGER
CITY CLERK

March 29, 1976

United States Department of the Interior
Bureau of Land Management
State Office
P. O. Box 1449
Santa Fe, New Mexico 87501

Re: 1972 (911)
XM 22986

Gentlemen:

Thank you for the opportunity to review the Environmental Impact Statement draft prepared for Greenlee County, Arizona, to El Paso, Texas, 345 KV Transmission Lines. In commenting on this report we will limit our observations to its adequacy and not become involved with its merits.

First, on page 56, line 6, the writer refers to "very steep-walled with 100% grades." We take this to mean vertical and not slopes having a 1:1 slope. Vertical or near-vertical slopes would require extensive blading, whereas 1:1 slopes would require moderate blading where being navigated by 4-wheel drive vehicles. 8

Second, we do not think it is desirable to create additional avenues to encourage off-road vehicles to criss-cross the desert areas, as suggested on page 143, line 3. The report does not indicate that any protective measures, such as fences extending several hundred feet to either side of the right-of-way, are to be used. Rather, the report suggests that this is a desirable activity and it should be encouraged. 9

Third, page 184, V.A. - 2, Soils, speaks of the question of erosion. Consideration should be given to wind erosion and extended straight line roadways which will create possibilities of excessive blowing dust. Perhaps meandering roadways 10

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

10

500 EAST SAN ANTONIO AVENUE • EL PASO, TEXAS 79901 • 915/543-6060

United States Department of the Interior
Santa Fe, New Mexico

Re: 1972 (911)
XM 22986

over the right-of-way will create a "self-healing" effect for this kind of erosion.

Would it be unreasonable to require some revegetation plan by sowing native grass seeds and watering once or twice with a water truck? While the problem is generally discussed on pages 187 and 188, there are no suggestions offered to this end. 10

Fourth, electrical interference with radio and television may occur along roadways and adjacent residential developments. This is suggested on page 150, but we do not find any mention in the report of future requirements to eliminate this by additional grounding methods or other means. We feel there should be some requirement relating to this interference. 11

Thank you again for allowing the City of El Paso to study this report and to offer our comments.

Sincerely yours,

Don Henderson

Don Henderson
Mayor

Response to Comments from City of El Paso, Texas

8. Comment refers to page 53, not 56. Correction has been incorporated in the text.

9. At the present ORV regulations are being formulated. Construction will not provide permanent access for ORVs as roads used for construction purposes will be closed following completion of these lines.

10. See changes in text on page 176. Also refer to Appendix E, item C-11. Since the roads are of a temporary nature, straight roadways minimize the surface disturbance. The use of one time watering efforts would not significantly enhance the revegetation of this area.

11. Proper installation and maintenance procedures will keep corona effect and resultant interference to a minimum. See page 15.

IN REPLY REFER TO: HP

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

POST OFFICE BOX 1306
ALBUQUERQUE, NEW MEXICO 87103

Date Routed APR 2 1976

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April 1, 1976

Memorandum

To: State Director, Bureau of Land Management, Santa Fe, New Mexico 87501

From: Assistant Regional Director

Subject: Review of Draft Environmental Statement, Greenlee County, Arizona to El Paso, Texas, 345 KV Transmission Lines (76/6)

In response to your letter of February 19, 1976, addressed to the Bureau of Sport Fisheries and Wildlife, Washington, D.C., we have reviewed the subject draft statement and have the following comments.

Overall, the statement adequately portrays the impacts of the project on fish and wildlife. It is obvious that a great deal of attention has been given to alignments and construction features which would reduce project effects on these resources.

Specific comments are listed below.

On page 26, the last paragraph states that "where feasible, existing power line, pipeline, or railroad corridors were followed in an effort to restrict potential impact to areas already affected." In line with this statement, we suggest that consideration be given to the possibility of routing the transmission line along Highway 75 or the paralleling pipeline from the point these cross the Gila River to the Greenlee County Airport as an alternate route. By following existing facilities the need for providing access to new areas would be eliminated, and the impact on wildlife would be lessened. 12

Page 158. The first complete sentence at the top of the page states that Al Rodney's studies indicate that "...power lines greatly enhance the habitat for a number of species of birds of prey." This conclusion is not supported by the summary of his findings as presented in

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

Appendix F. His report evidently is based solely on observations made during helicopter flights along existing powerlines. Comparative observations made in flights over similar habitat areas without power lines would be needed to determine whether birds of prey actually concentrate along power lines. We might suggest also 13
that counts from a fixed-wing aircraft be made as a check of the adequacy of observations from a helicopter. Some birds are highly sensitive to vibrations emanating from helicopter rotors and may move out of the area before the observer is within visual range. Therefore, Rodney's findings may be of more value as an indicator of trends than of total numbers.

Jack P Woolstenhulme

cc:
Field Supervisors, FWS, Ecological Services, Albuquerque, New Mexico and Phoenix, Arizona

Response to Comments from U. S. Fish and Wildlife Service

12. This alternative was excluded from further consideration during preliminary investigations because of the significant visual intrusions it would impose on Highway 75.

13. The study accomplished its purpose and should be interpreted as an indicator of trends.

ARIZONA WILDLIFE FEDERATION
P.O. Box 1769 • Phoenix, Arizona 85001 • Phone (602) 252-7371

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Other

31 March 1976

Arthur Zimmerman, State Director
Bureau of Land Management
P.O. Box 1449
Santa Fe, New Mexico 87501

Dear Mr. Zimmerman:

The Arizona Wildlife Federation has asked me to comment on the Draft Environmental Impact Statement "Greenlee County Arizona to El Paso Texas 345 KV Transmission Lines". Since only a minor portion of this proposal impacts Arizona, these comments will be confined to that portion of the proposed route that is west of Lordsburg, New Mexico.

I believe the DES gives a fair description of the wildlife component, but the probable impact on wildlife (Section III B 2) is lacking. Although 400 or more species of wildlife are listed in the Appendix as occurring in the area, only three pages are devoted to describing the probable impact on these species. This section should be greatly expanded in the final statement. 14

By far the greatest impact to wildlife by a project such as this is from increased human activity during construction and from the use of construction roads by the public after project completion. This is especially true in areas which are now roadless. The companies' construction policy states (Appendix E, A.9.) "unobtrusiveness will not be achieved at the expense of invading a virgin, undeveloped area.". However, the Virden Alternate, west of Lordsburg, was originally proposed and favored by the company. The Virden Alternate has no existing right of way or other access. Was the companies' construction policy developed before or after the selection of the prime route? 15

From a wildlife standpoint, roadside aesthetics should be ignored if good wildlife country is threatened. Although the prime route west of Lordsburg does not traverse what could be called prime wildlife habitat, the U.S. 70 Alternate would create the least impact on wildlife, wildlife habitat and soils. The Virden Alternate, because of its comparative impact on all living and non-living environmental components should not even be considered as a possible alternate route. 16

15

The U.S. 70 Alternate would be the favored route west of Lordsburg. Trunk road access is apparently already available for most of this route.

Except for the true riparian habitat along the Gila River, the desert riparian, or "semi-riparian" areas as they are termed in the DES, constitute the most important wildlife habitat along the proposed route. Mitigating measures should include stipulations as to how and where these may be crossed and to insure existing access is used during road construction. All other proposed mitigating measures in the DES should be stipulated in the easment. The use of helicopters should be stipulated in the construction of the 14 miles of line from the Gila River crossing to the Greenlee substation. 17

How are the stipulations regarding areas of "blade-up" operation, use of graders rather than dozers, use of rubber tired vehicles only etc. to be enforced. An authorized officer of the agency (BLM) with his salary compensated by the company should be assigned full time to oversee construction procedure and to insure that all easement stipulations are followed. 18

Requiring rehabilitation of areas unnecessarily disturbed during construction is never as good as preventing unnecessary disturbance in the first place. An unneeded road bladed through the vegetation types along the proposed route cannot be rehabilitated except through the passage of time, and the time required may be hundreds of years. 19

Thank you for the opportunity to comment on this DES, and hope these comments will be considered when preparing the Final Environmental Impact Statement.

Sincerely,

Steve Bingham

Steve Bingham, Chairman
BLM Lands Committee

Response to Comments From Arizona Wildlife Federation

14. We feel the statement adequately discusses the impacts of the proposal on wildlife. This section has been expanded to include a short discussion about antelope and prairie dogs. Refer to response to Arizona Game and Fish Department.

15. The companies' construction policy was developed prior to the selection of any routes. Although the maps in this statement do not show all of them, many roads and trails exist in the Virden area.

16. The comparative impacts of alternate routes are adequately discussed in the statement.

17. Mitigating measures will be converted into site-specific stipulations if the right-of-way is granted. Until exact tower placement is determined, it would be unreasonable to require any specific construction limitations. The requirement for use of helicopter construction will be made on a site-specific basis. At this time it does appear that this section of the line will require some helicopter use.

18. A BLM inspector will be assigned to this project under the BLM/right-of-way cost recovery procedures.

19. BLM policy is in full agreement with this statement.

United States Department of the Interior

BUREAU OF RECLAMATION
WASHINGTON, D.C. 20240

IN REPLY
REFER TO: 610
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NEW MEXICO

Mr. Arthur W. Zimmerman
State Director
Bureau of Land Management
Department of the Interior
P.O. Box 1449
Santa Fe, New Mexico 87501

Dear Mr. Zimmerman:

In response to your letter of February 19, 1976, we have reviewed the draft environmental statement for the Greenlee County, Arizona, to El Paso, Texas, 345-kV transmission lines.

Our comments are enclosed. We hope the comments will be helpful in the preparation of the final environmental statement.

Sincerely yours,

E F Sullivan

Assistant
Commissioner

Enclosure

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REVOLUTION BICENTENNIAL 1776-1976

16

Comments on the Draft Environmental Statement for Greenlee County, Arizona, to El Paso, Texas, 345-kV Transmission Lines

Summary section and page 1: Revise section 2 of the Summary section to read: "Public Service Company of New Mexico and the El Paso Electric Company who propose to construct two 345-kV transmission lines, ..." 20

The draft statement does not address the functions, responsibilities, service areas, or sources of power for each of the utility companies involved. We believe that it would be proper to include a summary of the information in chapter I.A. prior to the description of the proposal to grant rights-of-way.

The projected loads for the next 10 years for the southwestern New Mexico area appear reasonable. There is a considerable load associated with the copper industry in southwestern New Mexico which is expected to increase over the next 10 years. Until recently, most of that industrial load was served by gas-fired generating units owned by the industry. With the decreasing availability of gas for industrial uses, all of the load will shortly be furnished by the local utilities.

A portion of the 115-kilovolt transmission system of the Bureau of Reclamation's Rio Grande Project in the area was severely overloaded last year and will continue to be overloaded due to the loads in southwestern New Mexico until such time as additional transmission facilities are provided.

A proposal was included in the final environmental statement (ER 75/393) for the Palo Verde Generating Station, page 3-32, Project 3, to construct a 345-kV transmission line from the Greenlee Substation (near Duncan, Arizona) to the Rio Grande Power Station (near El Paso, Texas) as a part of the Palo Verde Nuclear Project. The line would run parallel to a proposed (1976) 345-kV line from Duncan, Arizona, to near Arden Hills, New Mexico, where they would separate, and the Project 3 line would continue on to the Rio Grande Power Station. We recommend that the matter be specifically addressed in conjunction with the second paragraph, page 5, of the subject draft statement and in item 2 of the Summary section to indicate how the two lines interface and to acknowledge the Project 3 line as one of the proposed lines. The ownership and operation and maintenance responsibilities for the lines should also be discussed in the draft statement. 21

Several of the figures need to have a "north" orientation arrow and an inset showing the proposed route in relation to the Southwestern United States. 22

It would be helpful to have a table showing the number of men required to construct the proposed project and the time involved in each phase of construction. 23

Page 23: No mention could be found of the waste materials discussed in the first paragraph in either the impacts or mitigation sections. We assume waste material will be properly disposed of so it does not constitute a serious impact. This point should be made clear in the environmental statement. 24

Page 74: The explanation of the reversal of soil compaction terminology should be placed before and/or within Table 8 which is shown on pages 69 to 73. 25

Pages 104 and 105: It appears that the last three sentences on page 104 and the entire narrative on page 105 would be more appropriate in the impacts chapter, (chapter III). 26

Pages 106 and 159, Archeology: The environmental statement should indicate if there has been compliance with 36 CFR, part 800. 27

Pages 110 to 126: Impacts are discussed intermittently within sections on these pages. The impacts should be discussed later in chapter III.

Page 127, Impacts: The section could be improved by deletion of excess words and generalities. Extensive review is needed to bring together an idea of the impacts. A tabular summary with notes would be helpful. 28

Pages 142 and 143: The impact of increased intrusion by off-road vehicles should be discussed in this section. 29

Pages 144 to 150, Public Utilities: The discussion leaves the impression that serious problems of compatibility have not been resolved. 30

Page 147: The description of the railroad's electronic equipment should be placed in chapter II, which describes the existing environment, if it needs to be included at all. 31

Page 157: The Ecological Interrelationships section seems to have the most succinct evaluation of impacts in the entire chapter. If the rest of the chapter was as concise, we believe it would be of greater value.

Page 177, Topography: What impact will fill and excavation material have on biota? Where will the material come from? The word "considered" as used on this page has little meaning from the standpoint of actions which will be taken. The narrative should express a definite plan of action to be taken, if practicable. 32

Page 188, section C: The statement only says there will be a change. It would assist the reader if the nature of the change and its significance, as discussed earlier, were summarized. Specify the adverse impact. 33

Page 191, first paragraph: The paragraph does not appear consistent with section D.1., on Archeology on pages 159 and 160. 34

Page 192: The statement, in the second paragraph, that increased human activity will have an irreversible impact seems to conflict with the conclusion of the third paragraph which states: "There is no evidence to indicate that the increased level of human activity would have an irreversible effect upon any of the flora or fauna of the area." 35

Pages 196 and 197, item 2: The paragraph generally discusses the proposed lines rather than the alternate to use or upgrade existing transmission lines. We note the concluding sentence that: "There are no transmission lines in the area which could be upgraded and used . . ." We suggest a more detailed explanation be given of the transmission system in the area. 36

Response to Comments from U. S. Bureau of Reclamation

20. Text has been revised.

21. The proposed line is proposed to be used for the transmission of power generated by the Palo Verde Generating Station. This station is expected to come on line in three phases during 1982, 1983, and 1984.

22. North indicators have been included on the maps. We believe Figure 1 adequately depicts the route in relation to the Southwest U. S.

23. See Description of Proposed Action, Section B. 3. pages 17-24.

24. See Mitigating Measures, Section h. 3.

25. Table 8 has been corrected.

26. We believe this section is the best place for this discussion.

27. See responses to comments from the National Park Service.

28. We believe the document adequately assesses the impacts.

29. Refer to response to comments from City of El Paso.

30. Refer to response to comments from Southern Pacific Pipe Lines.

31. This description was placed in this section so as to provide continuity in the discussion of impacts.

32. The actual impacts cannot be determined at this time, however, we are striving, through line and road location, construction procedures, etc., to keep the need for fill and excavation work to a minimum.

33. The changes cannot be quantified. See change in text.

34. Text has been corrected.

35. Text has been corrected.

36. Text has been corrected.

UNITED STATES
DEPARTMENT OF THE INTERIOR
~~BUREAU OF~~ OUTDOOR RECREATION
PACIFIC SOUTHWEST REGIONAL OFFICE
BOX 36062
450 GOLDEN GATE AVENUE
~~SAN FRANCISCO~~, CALIFORNIA 94102

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SANTA FE, NEW

April 2, 1976

Memorandum

To: State Director, Bureau of Land Management, New Mexico

From: Regional Director

Subject: Review of Draft Environmental Impact Statement for Greenlee County, Arizona, to El Paso, Texas, 345 KV Transmission Lines (DES-76-6)

In response to your February 19, 1976 request, we have reviewed the subject document and offer the following comments. This statement has not been reviewed by our South Central Regional Office in Albuquerque and, as such, may not fully cover jurisdictions of that office.

General Comments

The maps contained in the draft environmental statement are generally of insufficient scale and quality to accurately assess project impacts. Use of maps with scale and detail similar to that used in Figure 12 would improve the overall high quality of the draft environmental statement.

Specific Comments

There appears to be an inconsistency in commitments to minimize the environmental impacts when it is stated, on page 24, that ". . . any reseeding or other actions deemed necessary by the appropriate agencies will be accomplished . . . .", while the section on mitigation measures contains no statement regarding revegetation. The Companies' Constructio Policy, B6 (Clearing) and C4 (Access Road and Line Construction), clearly state that reseeding will take place ". . . if deemed necessary by the land management agency . . . in accordance with their

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

18

State Director
Bureau of Land Management, New Mexico

recommendations . . . ." (pages 268 and 270, respectively). We therefore suggest that the final environmental statement clearly state what revegetation plans will be undertaken, and the time frame over which such actions will take place. The section on mitigation measures should also include this ameliorative action.

While Larrea can, under unusual and extreme conditions, puncture weak rubber tires with little tread, that unlikely prospect does not seem to justify removal of 58 miles of vegetation and consequent soil disruption and accompanying visual impacts. The action of blading will also increase the potential for use of the right-of-way by off-road vehicles, an action which will permanently affect vegetative patterns, an action which is not advocated in the draft environmental statement. 39

The statement that creosote is prolific and can reoccupy disturbed areas "in the relatively short time of 2 to 4 years" contradicts other findings. Recent studies, e.g. "Effects of Pipeline Construction on the Creosote Bush Scrub Vegetation of the Mojave Desert", Madrono, January, 1975, by Vasek, et. al., demonstrates Larrea recovery rates on the order of 100 years. Other studies show sexual maturity of Larrea is not reached for several times the period mentioned for reoccupation, so the statement regarding recovery of vegetation should be substantiated. Because of the aesthetic impacts associated with any unnecessary blading, we feel that additional justification is needed for taking this action or it should not be taken, and that the final environmental statement be modified accordingly.

The rationale for use of structures and materials which would preclude possible inclusion of the Gila River into the Wild and Scenic Rivers System is not given in the draft environmental statement. 40 The final statement should, therefore, thoroughly describe the rationale for the decision not to use non-glare or non-reflective wire along the transmission corridor. Due to the environmental statement's acknowledgement of the impact of the proposed action on the potential addition of the Gila River to the Wild and Scenic River System, we recommend that non-glare wire be used, at least in areas of acknowledged scenic value and while crossing the river. 41 We also recommend that the river crossing be accomplished perpendicular to the river in order to minimize aesthetic impacts.

The section on alternatives should consider energy conservation as a viable alternative to the project. 42 Similarly, the more efficient

State Director
Bureau of Land Management, New Mexico

use of direct current (rather than alternating current), which has been widely adopted throughout Europe, should be discussed.

Frank E. Sylvester

cc: OEA, WASO

Bureau of Outdoor Recreation
South Central Region

Response to Comments from the Bureau of Outdoor Recreation

37. Some maps have been altered and one map added to help clarify the statement.

38. Refer to responses to City of El Paso and Department of Transportation.

39. Appropriate changes have been made.

40. See text change on page 9. Non-specular conductor will be used.

41. The river crossing will be as near to prependicular as possible.

42. See Alternatives to the Proposed Action, page 194, Section 5 for a discussion of direct current.

Southern Pacific Pipe Lines

610 SOUTH MAIN STREET, LOS ANGELES, CALIFORNIA 90014

R. R. McDANIEL
Manager · Engineering

'76 APR 6 AM 8:40

SANTA FE, NEW MEXICO

April 1, 1976

TELEPHONE (213) 624-9461
In reply please refer to
APR 6 1976 FILE
ENG 8-2

1 pcs

State Director
Bureau of Land Management
P. O. Box 1449
Santa Fe, New Mexico 87501

Dear Sir:

Please refer to your letter of February 19, 1976 and to the Draft Environmental Statement for the Greenlee County, Arizona to El Paso, Texas 345 KV Transmission Lines.

Southern Pacific Pipe Lines (SPPL) a wholly-owned subsidiary of Southern Pacific Company, is mentioned on Page 145 under Public Utilities; however, the route of its pipelines and the proposed separation from the transmission lines is not covered in the Statement. SPPL owns and operates an 8 and 12-inch diameter pipeline along the proposed transmission line routes.

From the point where the Prime Route for the First Line intersects the El Paso Natural Gas Co. (EPNG) right-of-way (Page 36 in the Statement) to the point westerly, where the EPNG right-of-way intersects the Southern Pacific Railroad (approximately 19 miles), the two SPPL pipelines are approximately parallel with and approximately 300 feet to 1,000 feet northerly from the EPNG pipelines. Positioning the transmission line 1,000 feet north of EPNG (Page 36) would place it entirely too close to the SPPL pipelines.

From the point where EPNG intersects Southern Pacific Transportation Co. railroad to Carne Siding, 9 miles east of Deming, the two transmission lines are planned to parallel the railroad. No separation distance is mentioned in the report for this 26 miles where throughout the entire distance the two SPPL pipelines are located on railroad right-of-way; mostly on the northerly side.

An alternate route for the transmission lines east of Lordsburg is described on Page 45. This route would parallel Interstate 10 and the Southern Pacific railroad for approximately 48.4 miles. The two SPPL pipelines are located on the southerly side of the railroad right-of-way throughout this area.

21

State Director
Bureau of Land Management

April 1, 1976

The summary of the EPNG report, on Pages 145 and 146, applies equally to SPPL pipelines; therefore, adequate separation should be maintained between the transmission lines and SPPL pipelines, as well as between the transmission lines and EPNG pipelines.

It appears that a separation of 1,000 feet between transmission lines and pipelines has been selected for this project. We do not know whether this distance will entirely prevent electrical hazards to the pipelines and personnel, but do believe that any detrimental affects that may occur can be lessened by known methods and equipment.

SPPL's Black Mesa Pipeline in Northern Arizona has been paralleled by two 535 KV transmission lines operated by Arizona Public Service Company. Voltages which produced shocks were induced on the pipeline and employees have become vulnerable to accidents in the event of lightning strikes and transmission line faults. The pipeline would have been more adversely affected if another pipeline were not between it and the transmission lines. The Four Corners Pipeline affords a degree of shielding for the Black Mesa Pipeline, because it is situated closer to the transmission lines. In the case of the Greenlee County to El Paso transmission lines, SPPL's pipelines would provide shielding for EPNG's pipelines.

Safety and mitigative devices were designed and installed on the Black Mesa Pipeline and Four Corners Pipeline at considerable expense. Although providing adequate protection against inductive voltages at present, the facilities are subject to damage by vandals and deterioration with age. Continuous monitoring and maintenance are required. Furthermore, it is not known whether the facilities will be adequate to prevent damage and injury in event of faults and/or lightning strikes.

Southern Pacific Pipe Lines requests that the route for the transmission lines be located at least 1,000 feet from its nearest pipeline. 43

We feel that Southern Pacific Pipe Lines should be reimbursed for all expenses incurred for testing, design, installation, operation and maintenance of any mitigative and safety facilities, including future improvements consistent with state-of-the art advancements in mitigative technology, made necessary by the operation of the transmission lines.

State Director
Bureau of Land Management

April 1, 1976

We would also expect Southern Pacific Pipe Lines to be indemnified and held harmless in case of damages and injuries attributed to operation of the transmission lines.

Sincerely yours,

R R McDaniel

R. R. McDaniel

cc: Mr. W. L. Lyon, Jr.
El Paso Electric Company
P. O. Box 982
El Paso, Texas 79999

Response to Comment from Southern Pacific Pipe Lines

Wherever possible, at least 1000 feet of separation will be maintained between the power line center line, and existing pipelines.

43. All existing rights-of-way will be protected through specific conditions of the new right-of-way. Refer to Appendix D and Section 7 on page 174 Also text has been corrected on page 36.

REAL ESTATE MART

220 SOUTH GOLD AVENUE
DEMING, NEW MEXICO 88030
TELEPHONE (505) 546-2202

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March 26, 1976

New Mexico State Director
Bureau of Land Management
P.O. Box 1449
Santa Fe, New Mexico 87501

Gentlemen:

We are concerned with the proposed installation of two 345 KV electric transmission lines from Greenlee, Arizona to El Paso, Texas as mentioned in the enclosed article which appeared in the Deming Newspaper on February 23, 1976.

It is our understanding that the proposed routing will bisect approximately 280 acres we own in Section 16, Township 23 South, Range 9 West, N.M.P.M. Such routing will traverse lands, which as yet,have not been exposed to the impact of an east-west high voltage power transmission line.

If the proposed location is permitted, the value of our land and the lands of others, including public lands, will be significantly depreciated. The following would be some of the factors responsible for the depreciated land values: (1) routing on a diagonal to established rectangular surveys; (2) the unsightliness of the installation; (3) the destruction of virgin desert; (4) the increased hazards because of such high voltage in the area; (5) the destruction of radio and television signals in the area; and (6) the restriction of potential uses of near-by lands because of the high voltage of the lines.

In our case, where the line is proposed to travel a mere ½ mile, we consider today's dollar value of the damage to be done is in excess of several hundred thousand dollars. It is our belief that the proposed lines in the Deming vicinity should be located adjacent to and parallel with existing east-west high voltage transmission lines. To do so would eliminate the impact to virgin lands and would only affect properties where the damage has already been felt because of the existing lines.

Your help in affecting a relocation of the line in order to achieve the least possible damage to private and public lands is hoped for. We will be happy to help in any way possible and look forward to your prompt reply.

Very truly yours,

The Real Estate Mart, Inc.

Roe Pleyte

Roe Pleyte

RP:ka

Enc.

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Response to Comment from Real Estate Mart

44. Specific factors concerning exact routing, lease arrangements, sales agreements, etc., will be negotiated with each land owner by the company. The BLM has no regulatory authority on private land. Refer to the Residential Use Sections on pages 132 and 173.

Governor
RAUL H. CASTRO

Commissioners:
WILLIAM H. BEERS, Prescott, Chairman
CHARLES F. ROBERTS, O.D., Bisbee
FRANK FERGUSON, JR., Yuma
MILTON G. EVANS, Flagstaff
C. GENE TOLLE, Phoenix

Director
ROBERT A. JANTZEN

Asst. Director, Operations
PHIL M. COSPER

Asst. Director, Services
ROGER J. GRUENEWALD

ARIZONA GAME & FISH DEPARTMENT

2222 West Greenway Road Phoenix, Arizona 85023 942-3000

Date Routed APR 7 1976

April 6, 1976

Other

Mr. Arthur W. Zimmerman, State Director
Bureau of Land Management
P. O. Box 1449
Santa Fe, New Mexico

Dear Mr. Zimmerman:

Our Department has reviewed the Draft Environmental Statement pertaining to theproposed 345 KV transmission line from Greenlee County, Arizona to El Paso, Texas.

We are in basic agreement with the proposed route from the Greenlee substation to the Arizona line. However, our Department does have concerns with the route at its juncture with the Arizona-New Mexico border. First of all, the transmission line would pass within the range of one of the only remaining herds of antelope in southern Arizona. Secondly, approximately three miles into New Mexico, the proposed line would likely pass directly over the last remaining prairie dog colony in that region of Arizona and New Mexico. 45

If access roads are created during the construction of the proposed line, we ask that they be obliterated and reseeded to prevent undue human intrusion. 46

We appreciate the opportunity to review and comment on this DES. Please contact us if further comments are desired.

Sincerely,

Robert A. Jantzen, Director

Bruce R. Duke

By: Bruce R. Duke,
Project Evaluation Specialist

BRD:dd

cc: R. Kingery, AZ Clearinghouse

23

Response to Comments from Arizona Game and Fish Department

45. There should be no lasting adverse impact on the small herd of antelope that inhabits this area since construction roads will be closed upon the completion of construction. Our study does not indicate the presence of a prairie dog colony in this area. The closest colony is at least 50 miles from the proposed route. It should be noted, however, that the BLM Safford, Arizona district has recommended the introduction of the black tailed prairie dog into this area in its Management Framework Plan. This would take place following construction.

46. Refer to responses to comments from City of El Paso and the Department of Transportation.

B-2706

76 APR 9 AM 9:50

STATE OFFICE
SANTA FE, NEW MEXICO

Southern Pacific Transportation Company

One Market Street • San Francisco, California 94105

W. J. JONES
CHIEF ENGINEER

J. A. HOLMES
ASSISTANT CHIEF ENGINEER
T. H. KRUTTSCHNITT, JR.
ASSISTANT TO CHIEF ENGINEER
B. G. GALLACHER
ASSISTANT TO CHIEF ENGINEER

H. F. DULLY
ASSISTANT CHIEF ENGINEER-MAINTENANCE
R. E. FRAME
DISTRICT ENGINEER
J. F. LYNCH
DISTRICT ENGINEER-HOUSTON
M. J. KARLOVIC
DISTRICT ENGINEER

April 13, 1976

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IN REPLY PLEASE REFER TO

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State Director
Bureau of Land Management
P. O. Box 1449
Santa Fe, New Mexico 87501

Gentlemen:

Please refer to yours of March 31, furnishing us a copy of the Draft Environmental Impact Statement prepared on the Greenlee County, Arizona to El Paso, Texas 345 KV transmission lines and my letter of April 2 requesting an extension of time for filing any comments on this particular statement.

We have reviewed the above statement and feel that portions of our report that were furnished with my letter of October 31, 1974 should be incorporated in this draft before granting any right of way. These particular portions are quoted as follows: 47

"Because of the long parallel exposure, we feel that at least 2,000-foot separation must be maintained between the power line and the nearest railroad conductor. There is no way we can be positive that 2,000 feet will eliminate any problems to our equipment due to the newness of some of our electronic equipment. To be absolutely sure, we would require one-mile separation.

"The signal equipment that is located within the above area consists of standard DC controlled circuits utilizing both rail and line wires as a transmission medium, together with considerable carrier equipment operating centralized traffic control and hot box detectors. In addition, we are using analog devices for control of crossing protection which is very sensitive to any outside electrical interference.

"In the event the operation or maintenance of the transmission line at any time cause interference, including but not limited to physical interference, from electromagnetic induction, electostatic induction, or from stray or other currents, with the facilities of the railroad or of any lessees, or in any manner interferes with the operation, maintenance or use by the railroad of

28

its right of way, tracks, structures, pole lines, signal and communication lines, radio or other equipment, devices, other property or appurtenances thereto, El Paso power must agree to immediately undertake such changes in its own transmission lines and furnish such protective devices to the railroad and its lessees as shall be necessary in the judgment of the Railroad to eliminate such interference. The cost of such protective equipment and its installation must be borne solely by the El Paso Electric Company.

"In the event that the methods above set forth fail to eliminate such interference and if it is deemed necessary by the railroad that any or all facilities of the railroad or of any lessee thereof needs to be relocated, reconstructed, or otherwise changed, the entire cost of such changes must be borne by the El Paso Electric Company."

Would appreciate your arranging to have this included.

Yours very truly,

J. A. Holmes

Response to Comments from the Southern
Pacific Transportation Company

47. Your comments will be considered for incorporation during final alignment and granting of the right-of-way.

PCS

UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
WASHINGTON, D.C. 20545

APR 21 1976

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SANTA FE, NEW MEXICO

State Director
Bureau of Land Management
U.S. Department of the Interior
P. O. Box 1449
Santa Fe, New Mexico 87501

Dear Sir:

This is in response to your transmittal of February 19, 1976, inviting the Energy Research and Development Administration (ERDA) to review and comment on the Department's Draft Environmental Statement, DES 76-6, prepared by the Bureau of Land Management to support the proposed granting of rights-of-way to the Public Service of New Mexico and El Paso Electric Company, to construct two 345-Kv transmission lines from Greenlee County, Arizona to El Paso, Texas. We have reviewed the statement and have determined that the proposed action will not conflict with any known current or future ERDA plans and, therefore, have no objection to the proposed action. However, we have several comments which you might want to consider in the preparation of the final statement.

No mention is made in the statement of socioeconomic considerations. Such factors are included in many statements. For example, power available from these lines may result in some escalation of population growth which could cause several adverse effects, one of which would be on the already limited supplies of ground water. The depth of ground water in this area has lowered considerably in recent years. The increase in population could further increase the use of water and, hence, decrease the supply. There are limited sources of surface water in the area. 48

The question of biological effects due to the electromagnetic fields surrounding high voltage transmission lines is not discussed in the statement. Admittedly, the evidence is limited that adverse environmental effects do exist. Increasing attention is being accorded the problem, however, and since questions on the subject may arise, it would be prudent to allude to it. 49

One of the essential environmental concerns of the proposed powerline is its effects on the scenic and aesthetic qualities of the landscape. The statement discusses the possible adverse impacts on the aesthetics because much of the area is open country and the presence of the regular contours of powerlines negates some of the beauty. To some individuals this is an adverse impact, but to others it makes no difference. It is important for the reader, therefore, to properly visualize the powerline structures and their general effect on the landscape. The drawings of the support structures on pages 10 through 13 are of some help in this regard, but photographs of similar existing transmission lines would portray aesthetic effects much more realistically. 50

Some discussion of the energy conservation merits of extra-high voltage transmission lines may be in order. We also suggest that section VIII, Alternatives, should address the topic of energy conservation programs and activities by Public Service Company of New Mexico and El Paso Electric Company, and state whether such energy conservation practices could eliminate the need for the proposed transmission lines. This discussion seems appropriate for a report of this nature and, while it may not negate the need for the project, it can be dismissed as a nonviable alternative. 51

Other than the above comment, we feel that the treatment of the alternatives is reasonable, and that the entire statement presented an adequate description of the environment and a reasonable evaluation of the potential impact of the proposed transmission line.

Thank you for the opportunity to provide these comments.

Sincerely,

W. H. Pennington
Acting Director
Office of NEPA Coordination

cc: CEQ (5)

Response to Comments from the Energy Research and Development Administration

Since no new generation capabilities are proposed, the socio-economic aspects of the proposal were only superficially considered. It is not felt that any significant population or eco-
48. nomic impacts will result from this transmission line. The lowering of the water table was mentioned in the statement, however, it is not felt that the proposed transmission line will affect this trend.

During preparation of this statement we were unable to find any
49. quantifiable data concerning this subject. Further research is proposed in this area.

We believe there is ample opportuinty for interested parties to
50. view similar transmission lines throughout the Southwest.

The main purpose of the proposed transmission line is to assure
51. reliability and provide for limited growth in the service area. Conservation would not diminish the need for this line.

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APPENDIX A

DESCRIPTIONS OF THE SOIL ASSOCIATIONS
FOUND WITHIN THE STUDY AREA

1. Bluepoint-Onite

(Association.) This association occurs on nearly level to gently sloping and undulating landscapes. The soils, which are dominantly sandy and deep, are developing in sandy sediments of alluvial and eolian origin. Small areas of hummocky or wind-eroded soils are also included in this unit.

(Soils.) The Bluepoint soils commonly occur on gently sloping ridges that are slightly higher than the surrounding areas. Slopes are short and usually range between one and three percent.

The Onite soils typically occur on the smooth, nearly level to gently sloping areas between the ridges occupied by the Bluepoint soils. Other soils of lesser extent in this association include the deep soils of the Mohave, Mimbres, and Verhalen series.

2. Bluepoint-Yturbide

(Association.) This association includes the gently sloping and undulating alluvial fans and terraces above the flood plain of the Rio Grande. Slopes are dominantly within the two to three percent range. Small areas, however, comprising the side slopes of sandy ridges, as well as those adjacent to the arroyos and drainages, may attain slopes of 10 to 15 percent. The soils, which are deep and sandy, are forming in alluvial and eolian sediments of mixed origin. They are very susceptible to wind erosion, and as a result, there has been some shifting of soil development of coppice dunes around shrubs in many parts of this association. It is dissected by numerous intermittent drainages and arroyos of varying size that generally traverse the area in an east-west direction.

(Soils.) Bluepoint soils commonly occur on gently sloping and undulating alluvial fans.

Yturbide soils commonly occur on gravelly ridges and areas adjacent to the many intermittent drainages within this association.

Also in this association are small areas of nickel soils, coppice dunes, alluvial land, and riverwash.

3. <u>Cacique-Pintura-Wink</u>

(Association.) This association occurs west of the Rio Grande generally on an upland plain with slope gradients of less than 3 percent. Coppice dunes, which dominate the microrelief, form generally in and around mesquite shrubs. Dunes range from about 3 to 6 feet in height. The soils have formed in sandy sediments of mixed origin. Moderately deep soils are the most extensive and are usually underlain by caliche indurated in the upper 6 to 24 inches.

(Soils.) Cacique soils occupy nearly level to very gently sloping landscapes. They are most common away from the escarpments and often occur in broad, very slight depressional areas.

Pintura soils occupy the coppice dunes and those parts in this association that are gently rolling and duney.

Wink soils occur in slight depressional areas.

4. <u>Continental-Pinaleno-Cave</u>

(Association.) This association consists of nearly level to steep gravelly soils of the high terraces and valley slopes that occur above the Gila River bottomlands. The terraces are moderate

to extremely dissected and drained by washes that flow into the Gila River. These washes have cut deep canyons that have steep side slopes.

(Soils.) Continental soils occur on the tops of the terraces with slopes of 1 to 5 percent.

Pinaleno soils are at the lower edges of the terraces and on alluvial fans of slopes between 5 to 35 percent.

Cave soils are on the rounded ridges, terrace edges, and remnants of dissected terraces with slopes of 1 to 10 percent.

5. Gila-Glendale-Vinton

(Association.) This association includes the level to gently sloping flood plain of the Rio Grande. The soils, which are dominantly deep and highly stratified, are forming in alluvium of mixed origin. The major part of this association is irrigated land. A considerable acreage is occupied by roads, highways, and urban and other built-up areas. Although many soils in this unit are suitable for engineering installations, there are small areas of wet and saline-alkali soils and soils with moderate to high shrink-swell potential and low bearing capacities. Localized areas of this association need protection from flooding by runoff from adjacent, higher-lying lands.

(Soils.) Gila soils usually have a loam surface and are underlain by stratified loams and sandy loams.

Glendale soils have surfaces of loam or clay loam and are underlain by a stratification of silt loams, silty clay loams, and clay loams.

Vinton soils usually have surfaces of sandy loam and a subsoil stratified with loamy sand, loamy fine sand, and sandy loam.

Other soils common in this association are the Armijo, Brazito, Belen, Squa, and Anapra series.

6. Hondale-Mimbres-Bluepoint

(Association.) This association includes broad, nearly level to very gently sloping basin floors and valley bottoms. Although surrounding lands drain into this association, surface drainage of the association is poorly developed. The land surface is nearly level and generally undissected with the exception of a few scattered shallow arroyo channels. The only significant difference in local relief consists of slightly elevated ridges of sandy soils. These are commonly 1 to 3 feet higher than the surrounding nearly level land surfaces. The soils are developing in basin-fill sediments of mixed origin.

(Soils.) Hondale soils occur on the nearly level and gently sloping areas. They have a loam or silt loam surface over a clay subsoil.

Mimbres soils occur on the nearly level and gently sloping areas; however, they have surfaces of silty clay loam or loam over subsoils of silty clay loam or clay loam.

Bluepoint soils occupy the slightly elevated and gently sloping sandy ridges.

Other soils of the association include the Maricopa, Berino, Pintura, and Simona series.

7. Luzena-Arp-Balon

(Association.) This association is characterized by rolling to hilly landscapes interspersed with nearly level to gently sloping narrow valley bottoms and terraces. A few steep and very steep canyon walls and breaks are also included. The soils are developing dominantly in materials of acid igneous origin including conglomerates of the Gila and Datil formations.

(Soils.) Luzena soils occur on moderately steep and hilly landscapes. Igneous bedrock or conglomerate commonly occurs within 20 inches of the surface.

Arp soils occupy rolling and hilly landscapes with slopes ranging between 10 and 30 percent. Bedrock depth ranges from 20 to 40 inches.

Balon soils occupy gently sloping to moderately steep alluvial slopes and fans on the lower parts of hills and ridges. The soils are deep.

Other parts of the association include rockland, rough broken land, arroyo bottoms, and soils of the Oro Grande and Manzano series.

8. Mimbres-Gila

(Association.) This association includes the relatively broad, nearly level to gently sloping basin floor or plains area in the vicinity of Deming, New Mexico. Except for a few dunes and low alluvial ridges, the land surface is relatively smooth with a nearly uniform slope. The soils are deep and developing in alluvial

materials of mixed origin. Soils are extensively used for irrigated crops.

(Soils.) Mimbres soils occur on the areas developing from fine to medium textured alluvium.

Gila soils are developing in medium to moderately coarse-textured alluvial materials.

Other soils in this association include those of the Harkey, Hesperia, Maricopa, and Jal series.

9. Mohave-Stellar

(Association.) This association occupies the lower parts of the piedmont slopes or plains between the desert mountains and the relatively broad, nearly level basin floors. These soils are forming in old valley-filling sediments dominated by materials of acid igneous origin.

(Soils.) Mohave soils commonly occur on gently sloping piedmont surfaces.

Stellar soils occur on the nearly level basin floors to the very gently sloping drainageways and swales.

Other soils in this association include the Berino, Reakor, Dona Ana, Cacique, Walby, Wink, Jal, and Pintura series.

10. Nickel-Tencee-Delnorte

(Association.) This association includes the soils on the gently to strongly sloping piedmont slopes contiguous to the base of desert mountains and hills. It is generally dissected by numerous ephemeral streams and arroyos originating in the adjacent

mountain areas. Slopes along the ridge crests, fans, and terraces between the arroyos usually average about 2 to 5 percent, but they may range up to nearly 10 percent in the upper part where the association joins the mountain areas. Slopes of ridge sides adjacent to arroyo bottoms commonly exceed 10 percent. The soils, which are usually gravelly or cobbly, are forming in alluvial fan sediments of mixed origin.

(Soils.) Nickel soils occur on the gently and strongly sloping piedmont. The very gravelly caliche in the subsoil is weakly cemented.

Tencee soils occur in areas similar to those containing Nickel soils and mainly differ in that the caliche is indurated at depths ranging from 6 to 20 inches.

Delnorte soils are very similar to the Tencee soils in appearance and topographical location but differ in that the surface layers are less limey and contain caliche that is strongly cemented.

Other soils in this association include the Upton, Terino, Sonoita, Pinaleno, Dona Ana, Aladdin, Turney, Dalian, and Arizo series.

11. <u>Nickel-Upton-Tres Hermanos</u>

(Association.) This association includes gently to strongly and undulating piedmont slopes at the base of the desert mountains. It is common to find the association completely surrounding the rough broken and rockland areas dominated by hills and low

mountains. The soils, which are generally gravelly, are forming in coarse-textured alluvial fan sediments of mixed origin. The association is dissected by numerous ephemeral streams and arroyos originating in the adjacent mountain areas.

(Soils.) Nickel soils occupy gently to strongly sloping and undulating landscapes at the base of desert mountains.

Upton soils occur on areas similar to those of the Nickel soils but differ in that indurated caliche dominates at a depth of 6 to 20 inches.

Tres Hermanos soils usually occur on the more gently sloping landscapes.

Other soils in this association include the Turney, Mohave, Mimbres, Verhalen, and Lehmans series.

12. Pintura-Berino-Simona

(Association.) A characteristic feature of this association is the coppice dunes that dominate the microrelief. These dunes, which are forming generally in and around mesquite shrubs, range from 2 to 6 feet in height. Except for the dune microrelief, this association occurs in a nearly level to gently sloping plain, but it is found on a few discontinuous ridges of very duney and rolling topography.

The major soils of this association are sandy and highly susceptible to wind erosion; consequently there is little land in this unit that has not been affected by some degree of erosion.

(Soils.) The Pintura soils occupy the coppice dunes and the gently rolling, duney parts of the landscape.

Berino soils occur on nearly level to gently sloping interdune areas.

Simona soils occur on nearly level to very gently sloping landscapes.

Other soils in this association are the Mohave, Bluepoint, Wink, and Akela series.

13. Rockland-Lehmans

(Association.) This association includes mountain ranges, ridges, and hills. A characteristic feature of this unit is the steep to extremely steep slopes and shallow and rocky soils. Bedrock exposures are numerous. Soils in this association are developing in materials from a wide variety of bedrock types; acid igneous materials are the most extensive. Other rock types also contributing as materials for soil formation include basalt, limestone, monzonite, rhyolite, shale, and sandstone.

(Soils.) Rockland is a miscellaneous land type composed of very shallow soils and outcrops of bedrock. The bedrock outcrops commonly occur as vertical or nearly vertical ledges or exposures. A thin mantle of cobbly or stony soil material generally occurs between the outcrops of bedrock.

Lehmans soils occur on moderately steep and rolling to hilly landscapes.

Other soils in this association include the Lozier, Latom, Nickel, Upton, Luxor, Graham, and Brenda series.

14. <u>Rough Broken Land</u>

(Association.) This association includes rough broken lands that are more or less parallel to the Rio Grande and Gila Rivers. A characteristic feature of this unit is the moderately to steeply sloping landscape that is dissected by many drainageways. Dominated by rolling and steeply sloping lands with slopes up to 35 percent, the association also grades to gently sloping fans and terraces. The soils are forming in coarse-textured alluvial fan sediments of mixed origin.

(Soils.) The rough broken land occupies steep and rough lands that are dissected by many intermittent stream channels. Erosion is active over much of this unit.

Bluepoint soils commonly occupy the gently to strongly sloping fans and terraces as they approach the flood plain.

Caliza soils occur on gently sloping crests of narrow ridges.

Other soils of this association include the Yturbide, Nickel, Pajarito, Upton, Tencee, Dalian, and Arizo series.

15. <u>Simona-Cacique</u>

(Association.) This association occurs on nearly level to very gently sloping upland plains. Although small and scattered areas of moderately deep and deep soils occur in the association, the unit is dominated by shallow soils underlain by strongly cemented to indurated caliche. The dunes that do appear are scattered and generally are less than 3 feet high.

(Soils.) Simona soils are mainly on the nearly level to gently sloping uplands.

Cacique soils usually occur in very slight depressional areas that are nearly level to very gently sloping.

Other soils included in the association are the Tonuco, Cruces, Dona Ana, Pajarito, Berino, and Wink series.

16. Sonoita-Yturbide-Hap

(Association.) This association commonly occurs on gently to strongly sloping and undulating piedmont slopes at the base of mountain fronts. Slope gradients are dominantly less than 5 percent, but they may range up to 10 percent near the base of the mountains. The soils, characterized by their fine gravel content and resulting gritty textures, are developing in old valley fill sediments of granitic origin.

(Soils.) Sonoita soils occur on gently sloping and undulating piedmont slopes. Yturbide soils occupy gently sloping and undulating alluvial fan surfaces and aggraded stream channels.

Hap soils occur on gently to strongly sloping and undulating alluvial fans at the base of mountain ranges.

Other soils included in the association are the Mohave, Stellar, and Forrest series.

17. Verhalen-Glendale-Mimbres-Comoro

(Association.) This association includes soils which are dominantly deep and found on nearly level to gently sloping landscapes. The soils are forming in stratified alluvium of mixed

origin. A relatively wide variety of crops are grown on this association in what is locally known as Virden Valley.

(Soils.) Verhalen soils have a silty clay loam surface and a subsoil of clay or silty clay.

Glendale soils have a surface of silty clay loam and similar subsoils.

Mimbres soils have surfaces of silty clay loam or loam over a subsoil of silty clay loam or clay loam.

Comoro soils have a fine sandy loam surface and similar subsoil.

Other important soils in the association are the Grabe, Pima, and Arizo series.

APPENDIX B

A list of animals which occur in the area as either permanent residents, seasonal migrants, or occasional visitors showing their preferred habitat type and present classification under the Endangered Species Act of 1973.

Key to Preferred Habitat Types.*

1 - Riparian
2 - Creosote
3 - Mesquite
4 - Yucca Grassland
5 - Foothill Yucca

*These vegetative types are generalized and collective of a number of different plant communities found in the area. For example, mesquite includes mesquite dunes, mesquite grassland, mesquite creosote, and mesquite saltbush associations. Refer to part B.1 (Flora) in the text for their descriptions.

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Wi

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
BIRDS			
Common Loon Gavia immer	M	1	
Pied-billed Grebe Podilymbus podiceps	YL	1	
Horned Grebe Podiceps auritus	M	1	
White Pelican Pelecanus erythrorhynchos	W	1	
Double-crested Cormorant Phalacrocorax auritus	M	1	
Magnificent Frigatebird Fregata magnificens	W	1	
Wood Ibis Mycteria americana	M	1	Status Undeterm
White-faced Ibis Plegadis chihi	W	1	Status Undeterm
Common Egret Casmerodius albus	YL	1	
Snowy Egret Leucophoyx thula	S	1	
Great Blue Heron Ardea Herodias	YL	1	
Little Blue Heron Florida caerulea	M-S	1	
Green Heron Butorides virescens	YL	1	
Louisiana Heron Hydranassa tricolor	M	1	Uncommon

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Black-crowned Night Heron Nycticorax nycticorax	M	1	
American Bittern Botaurus tentiginosus	YL	1	
Least Bittern Ixobrychus exilis	M-S	1	
Canada Goose Branta canadensis	M-W	1	
White-fronted Goose Anser albifrons	M-W	1	
Snow Goose Chen hyperborea	W	1	
Blue Goose Chen caerulescens	M-W	1	
Mallard Anas platyrhynchos	M-W	1	
Mexican Duck Anas diazi	YL	1	Rare
Pintail Anas acuta	M-W	1	
Gadwell Anas strepera	M-W	1	
American Widegeon Mareca americana	M-W	1	
Blue-winged Teal Anas discors	M	1	
Cinnamon Teal Anas cyanoptera	M	1	
Green Winged Teal Anas carolinensis	M-W	1	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winte

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Redhead Aythya americana	M-W	1	
Canvasback Aythya valisineria	M-W	1	
Ring-necked Duck Aythya collaris	M-W	1	
Greater Scaup Aythya marila	M-W	1	
Lesser Scaup Aythya affinis	M-W	1	
Common Goldeneye Bucephala clangula	M-W	1	
Bufflehead Bucephala albeola	M-W	1	
Oldsquaw Clangula hyemalis	M-W	1	
White-winged Scoter Melanitta deglandi	Sp-W	1	
Ruddy Duck Oxyura jamaicensis	M-W	1	
Common Merganser Mergus merganser	M-W	1	
Red-breasted Merganser Mergus serrator	M-W	1	
Shoveler Spatula clypeata	M-W	1	
Turkey Vulture Cathartes aura	YL	All Habitats	
Black Vulture Coragyps stratus	S	All Habitats	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Mississippi Kite Ictinia mississippiensis	S	1	
Goshawk Accipiter gentilis	M	1	
Cooper's Hawk Accipiter cooperi	W	1,3	
Sharp-shinned Hawk Accipiter striatus	M	1	
Marsh Hawk Circus cyaneus	YL	All Habitats	
Rough-legged Hawk Buteo lagopus	M-W	3,4,5	
Ferruginous Hawk Buteo regalis	M-W	3,4,5	Status undetermined
Red-tailed Hawk Buteo jamaicensis	YL	All Habitats	
Swainson's Hawk Buteo swainsoni	M-S	All Habitats	
Harris Hawk Parabuteo unicinctus	M-S	1,3,4	
Zone-tailed Hawk Buteo albonotatus	S	1	Peripheral
Gray Hawk Buteo nitidus	S	1	
Golden Eagle Aquila chrysaetos	YL	All Habitats	
Bald Eagle Haliaeetos leucocephalus	M-S	1	
Osprey Pandion haliaetus	M	1	Status undetermined

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winte

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Caracara Caracara cheriway	S	3,4,5	
Praire Falcon Falco mexicanus	YL	3,4	Status undetermin
Pigeon Hawk Falco columbarius	M-W	3,4	
Sparrow Hawk Falco sparverius	YL	All Habitats	
Aplomado Falcon Falco femoralis	S	4	Status undetermin
Peregrine Falcon Falco peregrinus	M-W	1	Endangered
Greater Sandhill Crane Grus canadensis	M-W	1	
Virginia Rail Rallus limicola	M-W	1	
Sora Porzana carolina	M-W	1	
Common Gallinule Gallinula chloropus	YL	1	
American Coot Fulica americana	YL	1	
American Avocet Recurvirostra americana	M-W	1	
Black-necked Stilt Himantopus mexicanus	M	1	
Mountain Plover Eupoda montana	M-S	4	Status undetermin
Snowy Plover Charadrius alexandrinus	M-S	1	Status undetermin

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Marbled Godwit Limosa fedoa	M	1,3,4	
Sanderling Crocethia alba	M	1	
Pectoral Sandpiper Erolia melanotos	M	1	
Wilson's Phalarope Steganopus tricolor	M	1	
Northern Phalarope Lobipes lobatus	W	1	
Herring Gull Larus argentatus	W	1	
Ring-billed Gull Larus delawarensis	W	1	
Franklin's Gull Larus pipixcan	M	1	
Boraparte Gull Larus philadelphia	M	1	
Forster's Tern Sterna forsteri	M	1	
Least Tern Sterna albinfrons	M	1	
Caspian Tern Hydroprogne caspia	M	1	
Black Tern Chlidonias niger	M	1	
Sabine Gull Xema sabini	M	1	
Scaled Quail Callipepla squamata	YL	All Habitats	
Gambel's Quail Lophortyx gambelii	YL	All Habitats	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Wi

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
White-winged Pheasant Phasianus colchicus bianchivii	YL	1	
Band-tailed Pigeon Columba fasciata	M	1	
Rock Dove Columba livia	YL	1,3,5	
White-winged Dove Zenaida asiatica	M-S	All except 2	
Mourning Dove Zenaidura macroura	YL	All except 2	
Inca Dove Scardafella inca	M	1	
Ground Dove Columbigallina passerina	YL	1	
Yellow-billed Cuckoo Coccyzus americanus	M-S	1,3	
Roadrunner Geococcyx californianus	YL	All Habitats	
Barn Owl Tyto alba	YL	1	
Screech Owl Otus asio	YL	1	
Flammulated Owl Otus flammeolus	S	1	
Great-horned Owl Bubo virginianus	YL	1	
Pygmy Owl Glaucidium gnoma	YL	1	
Burrowing Owl Speotyto cunicularia	YL	3,4	Status undeterm

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Long-eared Owl Asio otus	M-S	1	
Short-eared Owl Asio Flammeus	M-W	1	
Spotted Owl Strix occidentalis	M	1	
Whip-poor-will Caprimulgus vociferus	M-S	5	
Poor-will Phalaenoptilus nuttalli	S	1&5	
Common Nighthawk Chordeiles minor	S	2,3,4,5	
Lesser Nighthawk Chordeiles acutipinnis	S	3,4,5	
Chimney Swift Chactura pelagica	M-S	1	
White-throated Swift Aeronautes saxatalis	W	1	
Black-chinned Hummingbird Archilochus alexandri	M-S	1,3	
Costa's Hummingbird Calypte costae	M-S	1,3,4	
Rufous Hummingbird Selasphorus rufus	M-S	1	
Broad-tailed Hummingbird Selasphorus platycercus	M-S	1	
Calliope Hummingbird Stellula calliope	M	1	
Belted Kingfisher Megaceryle alcyon	W	1	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Wi

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Red-shafted Flicker Colapte cafer	S	1,3,5	
Red-headed Woodpecker Melanerpes erythrocephalus	W	1	
Yellow-bellied Sapsucker Sphyrapicus varius	YL	1	
Hairy Sapsucker Dendrocopos villosus	YL	1	
Downy Sapsucker Dendrocopos pubescens	S	1	
Ladder-backed Woodpecker Dendrocopos scalaris	YL	1	
Acorn Woodpecker Melanerpes formicivorus	M	1	
Western Kingbird Tyrannus verticalis	W	3,4	
Cassin's Kingbird Tyrannus vociferans	M-S	5	
Weid's Crested Flycatcher Myiarchus tyrannulus	M-S	1	
Ash-throated Flycatcher Myiarchus cinerascens	M-S	1,3,4	
Olivaceous Flycatcher Myiarchus tuberculifer	M-S	1	
Eastern Phoebe Sayornis phoebe	W	1	
Black Phoebe Sayornis nigricans	M-S	1	
Say's Phoebe Sayornis saya	YL	1,3,4	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Traill's Flycatcher Empidonax traillii	S	1	
Hammond's Flycatcher Empidonax hammondii	M	1,3	
Dusky Flycatcher E. oberholseri	M	3,5	
Gray Flycatcher E. wrightii	M	1,3	
Western Flycatcher E. difficilis	S	1	
Coues' Flycatcher Contipus pertinax	M	1	
Western Wood Pewee Contopus sordidulus	M-S	1	
Olive-sided Flycatcher Nuttallornis borealis	M	1	
Vermilion Flycatcher Pyrocephalus rubinus	YL	1	
Horned Lark Eremophila alpestris	YL	3,4	
Violet-green Swallow Tachycineta thalassina	M-S	1	
Tree Swallow Iridoprocne bicolor	S	1	
Bank Swallow Riparia riparia	S	1	
Rough-winged Swallow Stelgidopteryx ruficollis	S	1	
Cliff Swallow Petrochelidon pyrrhonota	M-S	1	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winte

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Purple Martin Progne subis	M-S	1	
Barn Swallow Hirundo rustica	M-S	1	
Steller's Jay Cyanocitta stelleri	W	1	
Scrub Jay Aphelocoma coerulescens	YL	1	
Mexican Jay Aphelocoma ultramarina	YL	1	
Black-billed Magpie Pica pica	W	1	
Common Crow Corvus brachyrhynchos	W	1	
Common Raven Corvus corax	YL	All Habitats	
White-necked Raven Corvus cryptoleucus	YL	3,4,5	
Plain Titmouse Parus inornatus	YL	1	
Bridled Titmouse Parus wollweberi	S	1	
Verdin Auriparus flaviceps	YL	3,4	
Common Bushtit Psaltriparus minimus	YL	1	
Black-eared Bushtit Psaltriparus melanotes	YL	1	
White-breasted Nuthatch Sitta carolinensis	YL	1	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Winter Wren Troglodytes troglodytes	W	1,3	
Bewick's Wren Thryomanes bewickii	YL	3,4,5	
Cactus Wren Campylorhynchus brunneicapillum	M	2,3,4,5	
Canyon Wren Catherpes mexicanus	S	5	
Mockingbird Mimus polyglottos	S	3,4,5	
Brown Thrasher Toxostoma rufum	W	2,3	
Bendire's Thrasher Toxostoma bendirei	S	1,3	
Curve-billed Thrasher Toxostoma curvirostre	YL	2,3,5	
Crissal Thrasher Toxostoma dorsale	YL	1,3,5	
Sage Thrasher Oreoscoptes montanus	W	2,3,4,5	
Robin Turdus migratorius	YL	1	
Hermit Thrush Hylocichla guttata	W	1	
Swainson's Thrush Hylocichla ustulata	S	1	
Eastern Bluebird Sialia sialis	M-W	1,3	
Western Bluebird Sialia mexicana	YL	1,3,4,5	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Wi

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Townsend's Solitaire Myadestes townsendi	W	1,2,3	
Blue-gray Gnatcatcher Polioptila caerulea	S	1,3	
Black-tailed Gnatcatcher Polioptila melanura	YL	1	
Mountain Bluebird Sialia currucoides	W	1	
Water Pipit Anthus spinoletta	M	1,3,4	
Bohemian Waxwing Bombycilla garrual	M	All Habitats	
Cedar Waxwing Bombycilla cedrorum	W	1	
Phainopepla Phainopepla nitens	W	1,2,3,4	
Loggerhead Shrike Lanius ludovicianus	YL	1,3,4,5	
Starling Sturnus vulgaris	YL	1,3,4	
Bell's Vireo Vireo bellii	M	1	
Gray Vireo Vireo vicinior	M-S	1,3	
Warbling Vireo Vireo gilvus	M	1	
Orange-crowned Warbler Vermivora celata	M	3	
Virginia's Warbler Vermivora virginiae	S	1	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Lucy's Warbler Vermivora luciae	S	1,2	
Black-throated Blue Warbler Dendroica caerulescens	W	1	
Blackpoll Warbler Dendroica striata	Sp	1	
Yellow Warbler Dendroica petechia	Sp	1	
Myrtle Warbler Dendroica coronata	S	1	
Audubon's Warbler Dendroica auduboni	YL	1,3	
Hermit Warbler Dendroica occidentalis	F	1	
Black & White Warbler Mniotilta varia	M	1	
MacGillivray's Warbler Oporornis tolmiei	M	1,3	
Ovenbird Seiurus aurocapillus	M	1	
Yellow throat Geothlypis trichas	M	1	
American Redstart Setophaga ruticella	M	1	
House Sparrow Passer domesticus	YL	1	
Eastern Meadowlark Sturnella magna	YL	3,4	
Western Meadowlark Sturnella neglecta	W	3,4	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Wi

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Yellow-headed Blackbird *Xanthocephalus xanthocephalus*	W	1	
Red-winged Blackbird *Agelaius phoeniceus*	W	1	
Orchard Oriole *Icterus spurius*	M	1	
Hooded Oriole *Icterus cucullatus*	S	1	
Scott's Oriole *Icterus parisorum*	S	3,4,5	
Bullock's Oriole *Icterus bullockii*	S	1	
Brewer's Blackbird *Euphagus cyanocephalus*	W	1,3,4,5	
Boat-tailed Grackle *Cassidix mexicanus*	YL	1	
Brown-headed Cowbird *Molothrus ater*	YL	1	
Western Tanager *Pinanga ludoviciana*	M	1	
Summer Tanager *Pinanga rubra*	M-S	1	
Pyrrhuloxia *Pyrrhuloxia sinuata*	YL	3	
Rose-breasted Brosbeak *Pheucticus ludovicianus*	M	1	
Indigo Bunting *Passerina cyanea*	S	1	
Lazuli Bunting *Passerina amoena*	M	1,3	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Painted Bunting Passerina ciris	S	1,3	
Evening Grosbeak Hesperiphona vespertina	W	1	
House Finch Carpodacus mexicanus	YL	1,3	
Pine Siskin Spinus pinus	M	1,3	
American Goldfinch Spinus tristis	M	1	
Lesser Goldfinch Spinus psaltria	W	1,3	
Lawrence's Goldfinch Spinus lawrencei	W	1,3	
Green-tailed Towhee Chlorura chlorura	W	1,3	
Rufous-sided Towhee Pipilo erythrophthalmus	YL	1,3	
Brown Towhee Pipilo fuscus	YL	3	
Lark Bunting Calamospiza melanocorys	W	3	
Savannah Sparrow Passerculus sandwichensis	W	3,4	
Grasshopper Sparrow Ammodramus savannarum	M	3,4	
Baird's Sparrow Ammodramus bairdii	F	3,4	
Lark Sparrow Chodestes grammacus	S	3,4	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winte

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Vesper Sparrow Pooecetes gramineus	W	3,4	
Rufous-crowned Sparrow Aimophila ruficeps	S	3,4	
Cassin's Sparrow Aimophila cassinii	W	3,5	
Black-throated Sparrow Amphispiza bilineata	YL	2,3,5	
Sage Sparrow Amphispiza belli	W	3	
Slate-colored Junco Junco hyemalis	W	1	
Oregon Junco Junco oreganus	W	1,3	
Gray-headed Junco Junco caniceps	W	1	
Chipping Sparrow Spizella passerina	W	1	
Clay-colored Sparrow Spizella pallida	M	3	
Brewer's Sparrow Spizella brewerii	W	3	
Black-chinned Sparrow Spizella atrogularis	YL	1	
Harris Sparrow Zonotrichia querula	M	1	
White-crowned Sparrow Zonotrichia leucophrys	W	3,4,5	
Golden-crowned Sparrow Zonotrichia atricapilla	W	3	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
White-throated Sparrow Zonotrichia albicollis	W	1,3	
Fox Sparrow Passerella iliaca	W	1	
Lincoln's Sparrow Melospiza lincolnii	W	1,3	
Song Sparrow Melospiza melodia	W	1,3	
McCown's Longspur Rhynchophanes mccownii	W	3,4	
Chestnut-collared Longspur Calcarius ornatus	W	3,4	
Dickcissel Spiza americana	M	3,4	

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YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Wi

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
MAMMALS			
Opossum Didelphis marsupialis	YL	1	
Gray Shrew Notiosorex crawfordi	YL	1,3,5	
Leafnose Bat Macrotus californicus	M-S	All Habitats	
Little Brown Myotis Myotis lucifugus	M-S	All Habitats	
Yuma Myotis Myotis yumanensis	M-S	All Habitats	
Cave Myotis Myotis velifer	M-S	All Habitats	
Arizona Myotis Myotis occultus	M-S	All Habitats	
Fringed Myotis Myotis thysanodes	M-S	All Habitats	
Long-legged Myotis Myotis volans	M-S	All Habitats	
California Myotis Myotis californicus	M-S	All Habitats	
Small-footed Myotis Myotis subulatus	M-S	All Habitats	
Silver-haired Bat Lasionycteris noctivagans	M-S	All Habitats	
Western Pipestrel Pipistrellus hesperus	M-S	All Habitats	
Big Brown Bat Eptesicus fuscus	M-S	All Habitats	
Red Bat Lasiurus borealis	M-S	All Habitats	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Hoary Bat Lasiurus cinereus	M-S	All Habitats	
Spotted Bat Euderma maculata	M-S	All Habitats	Rare
Western Big-eared Bat Plecotus townsendi	M-S	All Habitats	
Pallid Bat Antrozous pallidus	M-S	All Habitats	
Mexican Freetail Bat Tadarida brasiliensis	M-S	All Habitats	
Big Freetail Bat Tadarida molossa	M-S	All Habitats	
Racoon Procyon lotor	YL	1	
Ringtail Bassariscus Astutus	YL	1,3	
Badger Taxidea taxus	YL	All Habitats	
Spotted Skunk Spilogale putorius	YL	1,3	
Striped Skunk Mephitis mephitis	YL	1,3,5	
Hooded Skunk Mephitis macroura	YL	1,3	
Hognose Skunk Conepatus leuconotus	YL	1,3	
Coyote Canis latrans	YL	All Habitats	
Red Fox Vulpes fulva	YL	1,3	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winte

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Kit Fox Vulpes macrotis	YL	All Habitats	
Gray Fox Urocyon cinereoargenteus	YL	3	
Mountain Lion Felis concolor	YL	1,3	
Bobcat Lynx rufus	YL	1,3,5	
Blacktail Prairie Dog Cynomys ludovicianus	YL	3,4	
Rock Squirrel Citellus variegatus	YL	3	
Spotted Ground Squirrel Citellus spilosoma	YL	2,3,4,5	
Valley Pocket Gopher Thomomys bottae	YL	3,4	
Plains Pocket Gopher Geomys bursaris	YL	3,4	
Desert Pocket Gopher Geomys arenaris	YL	1,3,4	
Mexican Pocket Gopher Cratogeomys castanops	YL	3	
Silky Pocket Mouse Perognathus flavus	YL	2,3,4,5	
Desert Pocket Mouse Perognathus penicillatus	YL	3	
Rock Pocket Mouse Perognathus intermedius	YL	3	
Hispid Pocket Mouse Perognathus hispidus	YL	3,4	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Bannertail Kangaroo Rat Dipodomys spectabilis	YL	2,3,4,5	
Ord Kangaroo Rat Dipodomys ordi	YL	2,3,4,5	
Merriam Kangaroo Rat Dipodomys merriami	YL	2,3,4,5	
Beaver Castor canadensis	YL	1	
Plains Harvest Mouse Reithrodontomys montanus	YL	3,4,5	
Western Harvest Mouse Reithrodontomys megalotis	YL	3,4	
Cactus Mouse Pereomyscus eremicus	YL	3,5	
Deer Mouse Peromyscus maniculatus	YL	All Habitats	
Bush Mouse Peromyscus boylei	YL	3	
Rock Mouse Peromyscus difficilis	YL	3	
Northern Grasshopper Mouse Onychomys leucogaster	YL	2,3,4,5	
Southern Grasshopper Mouse Onychomys torridus	YL	3,5	
Whitethroat Woodrat Neotoma albigula	YL	1,3	
Southern Plains Woodrat Neotoma micropus	YL	3,5	
Mexican Woodrat Neotoma mexicana	YL	3	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Win

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Hispid Cotton Rat Sigmodon hispidus	YL	1	
Least Cotton Rat Sigmodon minimus	YL	1	
Buff-bellied Cotton Rat Signodon fulviventer	YL	3,4	
Mexican Vole Microtus mexicanus	YL	2,3,4,5	
Norway Rat * Rattus norvegicus	YL	1	
Black Rat Rattus rattus	YL	1	
House Mouse Mus musculus	YL	1	
Western Jumping Mouse Zapus princeps	YL	1	
Porcupine Erethizon dorsatum	YL	1	
Whitetail Jackrabbit Lepus townsendi	YL	4,5	
Blacktail Jackrabbit Lepus californicus	YL	All Habitats	
Eastern Cottontail Sylvilagus floridanus	YL	1	
Desert Cottontail Sylvilagus auduboni	YL	All Habitats	
Mule Deer Odocoileus hemionus	YL	1,3	
Pronghorn Antelope Antilocapra americana	YL	3,4	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
REPTILES AND AMPHIBIANS			
Tiger Salamander Ambystoma tigrinum	YL	1	
Couch's Spadefoot Toad Scaphiopus couchi	YL	2,3,4	
Western Spadefoot Toad Scaphiopus hammondi	YL	3,4,5	
Plains Spadefoot Toad Scaphiopus bombifrons	YL	3,4	
Woodhouse's Toad Bufo woodhousei	YL	2,3,4	
Great Plains Toad Bufo cognatus	YL	1,3,4	
Texas Toad Bufo speciosus	YL	1,3	
Green Toad Bufo debilis	YL	3,4	
Red-spotted Toad Bufo punctatus	YL	1,5	
Canyon Tree Frog Hyla arenicolor	YL	1	
Leopard Frog Rana pipiens	YL	1	
Bullfrog Rana catesbeiana	YL	1	
Yellow Mud Turtle Kinosternon flavescens	YL	1	
Painted Turtle Chrysemys picta	YL	1	
Pond Slider Pseudemys scripta	YL	1	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winte

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Western Box Turtle Terrapene ornata	YL	1,3,4	
Spiny Softshell Trionyx spiniferus	YL	1	
Texas Banded Gecko Coleonyx brevis	YL	1	Possibly along fo hills of Franklin Mountains
Greater Earless Lizard Holbrookia texana	YL	1,2,5	
Collared Lizard Grotaphytus collaris	YL	5	
Leopard Lizard Crotaphytus wislizenii	YL	2,3,4,5	
Crevice Spiny Lizard Scelopurus poinsettii	YL	2,5	
Desert Spiny Lizard Scelopurus magister	YL	2	
Clarks Spiny Lizard Scelopurus clarki	YL	1,2,5	
Side-blotched Lizard Uta stansburiana	YL	2,3,4,5	
Tree Lizard Urosaurus ornatus	YL	1,3	
Texas Horned Lizard Phrynosoma cornutum	YL	All Habitats	
Round-tailed Horned Lizard Phrynosoma modestum	YL	All Habitats	
Gila Monster Heloderma suspectum	YL	1,2	
Great Plains Skink Eumeces obsoletus	YL	1,3,4	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Many-lined Skink Eumeces multivirgatus	YL	All Habitats	
New Mexican Whiptail Cnemidophorus neomexicanus	YL	1,3,4,5	
Little Striped Whiptail Cnemidophorus inornatus	YL	3,4	
Desert Grassland Whiptail Cnemidophorus uniparens	YL	3,4	
Chihuahua Whiptail Cnemidophorus exsanguis	YL	2,5	
Western Whiptail Cnemidophorus tigris	YL	All Habitats	
Checkered Whiptail Cnemidophorus tesselatus	YL	2,5	
Western Blind Snake Leptotyphlops humilis	YL	1,2,5	
Western Hognose Snake Heterodon nasicus	YL	1,3,4	
Ringneck Snake Diadophis punctatus	YL	1,5	
Coachwhip Masticophis flagellum	YL	2,3,4,5	
Striped Whipsnake Masticophis taeniatus	YL	5	
Western Patch-nosed Snake Salvadora hexalepis	YL	5	
Mountain Patch-nosed Snake Salvadora grahamial	YL	5	
Great Plains Rat Snake Elaphe guttata emoryi	YL	1	Found only in Rio Grande Valley

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winte

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Trans-Pecos Rat Snake Elaphe subocularis	YL	2	Franklin Mts. onl
Glossy Snake Arizona elegans	YL	2,3,4,5	
Gopher Snake Pituophis melanoleucus affinis	YL	All Habitats	
Common Kingsnake Lampropeltis getulus splendida	YL	All Habitats	
Long-nosed Snake Rhinocheilus lecontei	YL	2,3,5	
Common Garter Snake Thamnophis sirtalis	YL	1	
Black-necked Garter Snake Thamnophis cyrtopsis	YL	1,2,3,5	
Narrow-headed Garter Snake Thamnophis rufipunctatus	YL	1	Gila River only
Checkered Garter Snake Thamnophis marcianus	YL	1	
Western Ground Snake Sonora semiannulata	YL	All Habitats	
Western Hook-nosed Snake Gyalopion canum	YL	3,4	
Plains Black-headed Snake Tantilla nigriceps	YL	2,3,4,5	
Western Black-headed Snake Tantilla planiceps	YL	2,3,4,5	
Night Snake Hypsiglena torquata	YL	2,3,4,5	
Texas Lyre Snake Trimorphodon vilkinsoni	YL	2	Franklin Mts. on

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Arizona Coral Snake Micruroides euryxanthus	YL	1,3	Gila River only in New Mexico
Massasauga Sisturrus catenatus edwardsi	YL	3,4	
Western Diamond Back Rattlesnake Crotalus atrox	YL	1,2,3,4,5	
Black-tailed Rattlesnake Crotalus molossus	YL	5	
Western Rattlesnake Crotalus viridis	YL	2,3,4,5	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Win

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
INVERTEBRATES			
Tenebrionid Beetle Eodes longicollis	S	2,3,4,5	
Rabbit-brush Beetle Cystodemus wislizeni	S	2,3,4,5	
Metalic Leaf-beetle Chrysochus auratus	S	2,3,4,5	
Ladybird Beetle Hippodamia convergens	S	All Habitats	
Mesquite Girdler Oncideres rodosticta	S	3	
Broomweed Longhorn Beetle Crossidius pulchrus	S	3,4,5	
Monarch Butterfly Danaus plexippus	Sp-S	2,3,4,5	
Mourning-cloak Butterfly Nymphalis antiopa	Sp-S	1	
Swallowtail Papilio turnus	Sp-S	1	
Polyphemus Telea polyphemus	Sp-S	1	
Tent Caterpillar Malacosoma americana	Sp-S	All Habitats	
Clear-winged Moth Calesesia coccinea	Sp-S	All Habitats	
Noctarid Moth Erebus odora	Sp-S	All Habitats	
Painted Lady Vanessa cardui	Sp-S	3	
Damsel Fly Lestes sp.	Sp-S	1	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Dragon Flies Libellula sp.	S	1	
Mosquitoes Culex pipiens	S	1	
Horse or Deer Flies Silvius sp.	S	All Habitats	
House Fly Musca domestica	Sp-S-F	All Habitats	
Migratory Grasshopper Melanoplus biliteratus	S	All Habitats	
Field Cricket Acheta assimilis	S	All Habitats	
Mesa Grasshopper Trimerotropis vinculata	S	3,4	
Sand Cricket Stenopelmatus fasciatus	S	1,3,4	
Lubberly Locust Brachystola magna	S	3,4	
Desert Grasshopper Heliastus aridus	S	3,4	
Barber-pole Grasshopper Dactylotum pictum	S	1,3	
Carolina Locust Dissosteira carolina	S	1	
Lesser Migrating Locust Melanoplus atlanis	S	1	
Yellow Jacket Polistes sp.	Sp-S-F	All Habitats	
Honey Bee Apis mellifera	Sp-S-F	All Habitats	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Win

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Bumble Bee Bombus sp.	Sp-S-F	1	
Harvester Ant Pogonomyrmex occidentalis	Sp-S-F	3,4	
Digger Wasps Bombex sp.	Sp-S-F	3	
Water Strider Gerris sp.	Sp-S-F	1	
Backswimmer Notonecta undulata	Sp-S-F	1	
Water Boatman Arctocorixa interrypta	Sp-S-F	1	
Pentotomid Bug Peribalus limbolaruis	Sp-S-F	1	
Desert Stinkbug Eusattus convexus	Sp-S-F	1	
Ambush Bug Phymata erosa	Sp-S-F	All Habitats	
Squash Bug Anosa tristis	S	1,4,5	
Giant Water Bug Abedus sp.	S	1	
Minor Praying Mantis Litaneutria minor	S	3,4	
Walking Stick Diapheromera femorata	S	All Habitats	
Prairie Centipede Scolopendra sp.	S	3,4	
Common Centipede Scutigera forceps	YL	1,2,5	

YL-Yearlong; S-Summer, M-Spring & Fall Migration; Sp-Spring; F-Fall; W-Winter

Common & Scientific Name	Season of Use	Preferred Habitat Type	Classification or Remarks
Tarantula Spider Aphonopelma sp.	YL	All Habitats	
Black Widow Spider Latrodectus mactans	YL	All Habitats	
Desert Scorpion Centruriodes sp.	Sp-S-F	All Habitats	
Whiptail Scorpion Thelyphonus sp.	Sp-S-F	3,4,5	
Sand Scorpion Buthus sp.	Sp-S-F	3,4	

APPENDIX C

THE EASEMENT FOR RIGHT-OF-WAY FOR

ELECTRICAL POWER TRANSMISSION LINES

Easement for Right-of-Way for Electrical

Power Transmission Line

Pursuant to the Act of March 14, 1911, as amended, 43 USC S 961 (1970), and subject to valid existing rights, there is hereby granted to the ____,
herein after referred to as Grantee, an easement for a right-of-way over, across, and upon the public lands and reservations of the United States within the State of ______________ for an electrical power transmission line.

The easement hereby granted is for that portion of a 345 KV Electrical Power Transmission Line extending from the __________

____

which is situated in the State of ______________. Use of said easement for additional transmission lines or for other purpose is prohibited unless separately approved by the Department of the Interior. The route of the Line is delineated on maps comprising Exhibit A of Grantee's application for an easement dated ________, which was filed with the Bureau of Land Management on __________, in File No. ____________. The term of this grant is fifty (50) years from the date hereof. The width of the right-of-way hereby granted is __________ feet, being to the extent of __________ feet on each side of the centerline of the line.

An annual charge for the use and occupancy of public lands under the authority of this right-of-way permit will be determined

by the Authorized Officer in accordance with the provisions of 43 DFR 2802.1-7.

The annual charge shall be paid by Grantee to the Authorized Officer. Written notice of the amount of the annual charge will be given annually in advance by the Authorized Officer to Grantee.

This grant is made upon the express condition that each of the terms and conditions hereof, which are appended hereto and incorporated herein, shall be fully complied with by Grantee, and by accepting this grant, Grantee agrees and covenants to fully comply with each said terms and conditions, and to make timely payment of annual charges. Failure of Grantee to comply with said terms and conditions shall be cause for cancellation of this grant.

UNITED STATES OF AMERICA

By______________________________

State Director
Bureau of Land Management
(City) (State)

APPENDIX D

REGULATIONS PERTAINING TO THE ISSUANCE AND COMPLIANCE OF RIGHTS-OF-WAYS. (FROM THE CODE OF FEDERAL REGULATIONS, 43, PUBLIC LANDS: INTERIOR)

PART 2800—RIGHTS-OF-WAY, PRINCIPLES AND PROCEDURES

Subpart 2800—Rights-of-Way: General

§ 2801.1–5 Terms and conditions.

An applicant, by accepting a right-of-way, agrees and consents to comply with and be bound by the following terms and conditions, excepting those which the Secretary may waive in a particular case:

(a) To comply with State and Federal laws applicable to the project for which the right-of-way is approved, and to the lands which are included in the right-of-way, and lawful existing regulations thereunder.

(b) To clear and keep clear the lands within the right-of-way to the extent and in the manner directed by the superintendent in charge; and to dispose of all vegetative and other material cut, uprooted, or otherwise accumulated during the construction and maintenance of the project in such manner as to decrease the fire hazard and also in accordance with such instructions as the superintendent in charge may specify.

(c) To take such soil and resource conservation and protection measures, including weed control, on the land covered by the right-of-way as the superintendent in charge of such lands may request.

(d) To do everything reasonably within his power, both independently and on request of any duly authorized representative of the United States, to prevent and suppress fires on or near the lands to be occupied under the right-of-way, including making available such construction and maintenance forces as may be reasonably obtainable for the suppression of such fires.

(e) To build and repair such roads, fences, and trails as may be destroyed or injured by construction work and to build and maintain necessary and suitable crossings for all roads and trails that intersect the works constructed, maintained, or operated under the right-of-way.

(f) To pay the United States the full value for all damages to the lands or other property of the United States caused by him or by his employees, contractors, or employees of the contractors, and to indemnify the United States against any liability for damages to life, person or property arising from the occupancy or use of the lands under the right-of-way, except that where a right-of-way is granted hereunder to a State or other governmental agency which has no legal power to assume such a liability with respect to damages caused by it to lands or property, such agency in lieu thereof agrees to repair all such damages.

(g) To notify promptly the superintendent in charge of the amount of merchantable timber, if any, which will be cut, removed, or destroyed in the construction and maintenance of the project, and to pay the United States through such superintendent in advance of construction such sum of money as such superintendent may determine to be the full stumpage value of the timber to be so cut, removed, or destroyed.

(h) To comply with such other specified conditions, within the scope of the applicable statute and lawful regulations thereunder, with respect to the occupancy and use of the lands as may be found by the agency having supervision of the lands to be necessary as a condition to the approval of the right-of-way in order to render its use compatible with the public interest.

(i) That upon revocation or termination of the right-of-way, unless the requirement is waived in writing, he shall, so far as it is reasonably possible to do so, restore the land to its original condition to the entire satisfaction of the superintendent in charge.

(j) That he shall at all times keep the authorized officer informed of his address, and, in case of corporations, of the address of its principal place of business and of the names and addresses of its principal officers.

(k) That in the construction, operation, and maintenance of the project, he shall not discriminate against any employee or applicant for employment because of race, creed, color, or national origin and shall require an identical provision to be included in all subcontracts

(l) That the allowance of the right-of-way shall be subject to the express condition that the exercise thereof will not unduly interfere with the management, administration, or disposal by the United States of the lands affected thereby, and that he agrees and consents to the occupancy and use by the United States, its grantees, permittees, or lessees of any part of the right-of-way not actually occupied or required by the project, or the full and safe utilization thereof, for necessary operations incident to such management, administration, or disposal.

(m) That the right-of-way herein granted shall be subject to the express covenant that it will be modified, adapted, or discontinued if found by the Secretary to be necessary, without liability or expense to the United States, so as not to conflict with the use and occupancy of the land for any authorized works which may be hereafter constructed thereon under the authority of the United States.

Subpart 2850—Power Transmission Lines, General

Source: The provisions of this Subpart 2850 appear at 35 F.R. 9650, June 13, 1970, unless otherwise noted.

§ 2850.0-3 Statutory authority.

(a) The act of February 15, 1901 (31 Stat. 790; 43 U.S.C. 959), authorizes the Secretary under such regulations as he may fix, to permit the use of rights-of-way through public lands and certain reservations of the United States, for electrical plants, poles, and lines for the generation and distribution of electrical power, and for telephone and telegraph purposes, and for pipe lines, canals, ditches, water plants, and other purposes to the extent of the ground occupied by such canals, ditches, water plants, or other works permitted thereunder and not to exceed 50 feet on each side of the marginal limits thereof, or not to exceed 50 feet on each side of the center line of such pipe lines, telephone and telegraph lines, and transmission lines, by any citizen, association, or corporation of the United States, where it is intended by such to exercise the use permitted under the act.

(b) The act of March 4, 1911 (36 Stat. 1253; 43 U.S.C. 961), as amended, authorizes the head of the department having jurisdiction over the lands, under general regulations fixed by him, to grant an easement for rights-of-way for a period not exceeding 50 years, over and across public lands and reservations of the United States, for poles and lines for the transmission and distribution of electrical power, and for poles and lines for communication purposes and for radio, television and other forms of communication transmitting, relay and receiving structures and facilities to the extent of 200 feet on each side of the center line of such lines and poles and not to exceed four hundred feet by four hundred feet for superstructures and facilities to any citizen, association, or corporation of the United States, where it is intended by such to exercise the use permitted under the act.

(c) The applicability of the acts of February 15, 1901, and March 4, 1911, to rights-of-way for power purposes over public lands, was superseded by the Federal Power Act of June 10, 1920 (41 Stat. 1063), as amended by sections 201 to 213 inclusive, of the act of August 26, 1935 (49 Stat. 838; 16 U.S.C. 791–825r), as to power projects for the generation and transmission of hydroelectric power, defined in section 3(11) of the act, excepting distribution lines. Applications for hydroelectric power plant sites or rights-of-way for main or primary hydroelectric power transmission lines must be made to the Federal Power Commission, Washington, D.C., under the act of June 10, 1920, as amended. Rights-of-way for transmission lines which are not primary lines must be secured under the act of February 15, 1901, or the act of March 4, 1911. See 18 CFR 2.2.

Subpart 2851—Principals and Procedures, Power Transmission Lines

SOURCE: The provisions of this Subpart 2851 appear at 35 F.R. 9681, June 13, 1970, unless otherwise noted.

§ 2851.1 Nature of interest.

§ 2851.1-1 Terms and conditions.

(a) By accepting a right-of-way for a power transmission line, the applicant thereby agrees and consents to comply with and be bound by the following terms and conditions, excepting those which the Secretary may waive in a particular case, in addition to those specified in § 2801.1-5.

(1) To protect in a workmanlike manner, at crossings and at places in proximity to his transmission lines on the right-of-way authorized, in accordance with the rules prescribed in the National Electric Safety Code, all Government and other telephone, telegraph, and power transmission lines from contact and all highways and railroads from obstruction, and to maintain his transmission lines in such manner as not to menace life or property.

(2) Neither the privilege nor the right to occupy or use the lands for the purpose authorized shall relieve him of any legal liability for causing inductive or conductive interference between any project transmission line or other project works constructed, operated, or maintained by him on the servient lands, and any radio installation, telephone line, or other communication facilities now or hereafter constructed and operated by the United States or any agency thereof.

(3) Each application for authority to survey, locate, commence construction work and maintain a facility for the generation of electric power and energy or for the transmission or distribution of electric power and energy of 33 kilovolts or higher under this subpart shall be referred by the authorized officer to the Secretary of the Interior to determine the relationship of the proposed facility to the power-marketing program of the United States. Where the proposed facility will not conflict with the program of the United States the authorized officer, upon notification to that effect, will proceed to act upon the application. In the case of necessary changes respecting the proposed location, construction, or utilization of the facility in order to eliminate conflicts with the power-marketing program of the United States, the authorized officer shall obtain from the applicant written consent to or compliance with such requirements before taking further action on the application: *Provided, however*, That if increased costs to the applicant will result from changes to eliminate conflicts with the power-marketing program of the United States, and it is determined that a right-of-way should be granted, such changes will be required upon equitable contract arrangements covering costs and other appropriate factors.

(4) The applicant shall make provision, or bear the reasonable cost (as may be determined by the Secretary) of making provision for avoiding inductive or conductive interference between any transmission facility or other works constructed, operated, or maintained by it on the right-of-way authorized under the grant and any radio installation, telephone line, or other communication facilities existing when the right-of-way is authorized or any such installation, line or facility thereafter constructed or operated by the United States or any agency thereof. This provision shall not relieve the applicant from any responsibility or requirement which may be imposed by other lawful authority for avoiding or eliminating inductive or conductive interference.

(5) An applicant for a right-of-way for a transmission facility having a voltage of 33 kilovolts or more must, in addition to the requirements of § 2802, execute and file with its application a stipulation agreeing to accept the right-of-way grant subject to the following conditions:

(i) In the event the United States, pursuant to law, acquires the applicant's transmission or other facilities constructed on or across such right-of-way, the price to be paid by the United States shall not include or be affected by any value of the right-of-way granted to the applicant under authority of the regulations of this part.

(ii) The Department of the Interior shall be allowed to utilize for the transmission of electric power and energy any surplus capacity of the transmission facility in excess of the capacity needed by the holder of the grant (subsequently referred to in this paragraph as "holder") for the transmission of electric power and energy in connection with the holder's operations, or to increase the capacity of the transmission facility at the Department's expense and to utilize the increased capacity for the transmission of electric power and energy. Utilization by the Department of surplus or increased capacity shall be subject to the following terms and conditions:

(*a*) When the Department desires to utilize surplus capacity thought to exist in the transmission facility, notification will be given to the holder and the holder shall furnish to the Department within 30 days a certificate stating whether the transmission facility has any surplus capacity not needed by the holder for the transmission of electric power and energy in connection with the holder's operations and, if so, the amount of such surplus capacity.

(b) Where the certificate indicates that there is no surplus capacity or that the surplus capacity is less than that required by the Department the authorized officer may call upon the holder to furnish additional information upon which its certification is based. Upon receipt of such additional information the authorized officer shall determine, as a matter of fact, if surplus capacity is available and, if so, the amount of such surplus capacity.

(c) In order to utilize any surplus capacity determined to be available, or any increased capacity provided by the Department at its own expense, the Department may interconnect its transmission facilities with the holder's transmission facility in a manner conforming to approved standards of practice for the interconnection of transmission circuits.

(d) The expense of interconnection will be borne by the Department, and the Department will at all times provide and maintain adequate protective equipment to insure the normal and efficient operation of the holder's transmission facilities.

(e) After any interconnection is completed, the holder shall operate and maintain its transmission facilities in good condition, and, except in emergencies, shall maintain in a closed position all connections under the holder's control necessary to the transmission of the Department's power and energy over the holder's transmission facilities. The parties may by mutual consent open any switch where necessary or desirable for maintenance, repair or construction.

(f) The transmission of electric power and energy by the Department over the holder's transmission facilities will be effected in such manner, as will not interfere unreasonably with the holder's use of the transmission facilities in accordance with the holder's normal operating standards, except that the Department shall have the exclusive right to utilize any increased capacity of the transmission facility which has been provided at the Department's expense.

(g) The holder will not be obligated to allow the transmission of electric power and energy by the Department to any person receiving service from the holder on the date of the filing of the application for a grant, other than statutory preference customers including agencies of the Federal Government.

(h) The Department will pay to the holder an equitable share of the total monthly cost of that part of the holder's transmission facilities utilized by the Department for the transmission of electric power and energy, the payment to be an amount in dollars representing the same proportion of the total monthly cost of such part of the transmission facilities as the maximum amount in kilowatts of the power transmitted on a scheduled basis by the Department over the holder's transmission facilities bears to the total capacity in kilowatts of that portion of the transmission facilities. The total monthly cost will be determined in accordance with the system of accounts prescribed by the Federal Power Commission, exclusive of any investment by the Department in the part of the transmission facilities utilized by the Department.

(i) If, at any time subsequent to a certification by the holder or determination by the authorized officer that surplus capacity is available for utilization by the Department, the holder needs for the transmission of electric power and energy in connection with its operations the whole or any part of the capacity of the transmission facility theretofore certified or determined as being surplus to its needs, the holder may request the authorized officer to modify or revoke the previous certification or determination by making application to the authorized officer not later than 36 months in advance of the holder's needs. Any modification or revocation of the certification or determination shall not affect the right of the Department to utilize facilities provided at its expense or available under a contract entered into by reason of the equitable contract arrangements provided for in this section.

(j) If the Department and the holder disagree as to the existence or amount of surplus capacity in carrying out the terms and conditions of this paragraph, the disagreement shall be decided by a board of three persons composed as follows: The holder and the authorized officer shall each appoint a member of the board and the two members shall appoint a third member. If the members appointed by the holder and the authorized officer are unable to agree on the designation of the third member, he shall be designated by the Chief Judge of the United States Court of Appeals of the circuit in which the major share of the facilities involved is located. The board shall determine the issue and its determination, by majority vote, shall be binding on the Department and the holder.

(k) As used in this section, the term "transmission facility" includes (a) all types of facilities for the transmission of electric power and energy and facilities for the interconnection of such facilities, and (b) the entire transmission line and associated facilities, from substation or interconnection point to substation or interconnection point, of which the segment crossing the lands of the United States forms a part

(l) The terms and conditions prescribed in this paragraph may be modified at any time by means of a supplemental agreement negotiated between the holder and the Secretary of the Interior or his designee.

(b) Unless otherwise specified in a right-of-way granted under the act of March 4, 1911, and unless sooner canceled, the right-of-way shall expire 50 years from the date thereof. If, however, within the period of 1 year prior to the expiration date, the grantee shall file, in accordance with § 2802.1, a written application to renew the right-of-way, and shall agree to comply with all the laws and regulations existing at such expiration date governing the occupancy and use of the lands of the United States for the purpose desired, the right-of-way may be renewed for a period of not to exceed 50 years. If such application is filed, the existing right-of-way will be extended subject to then existing and future rules and regulations, pending consideration of the application.

(31 Stat. 790, 86 Stat. 1253; 43 U.S.C. 959, 961)

APPENDIX E

THE COMPANIES'

CONSTRUCTION POLICY

All of the following guidelines have been considered in selecting the proposed transmission corridor and alternates and will be adhered to by El Paso Electric Company and Public Service Company of New Mexico in the detailed line design and layout. Conferences will be held before structure spotting with concerned agencies, groups and individuals in order to identify, locate and avoid (if possible) any archaeological sites or any conflicts. Also, a post-construction conference will be held to insure that standards of construction were met and to establish maintenance criteria. Grantors of the various rights-of-way will be notified of the date and place of this conference to afford them the opportunity to participate. If, by chance, any of these standards were not met, remedial actions will be undertaken.

A. Rights-of-Way

1. Land-use planning (both present and future) and preservation of the environment will be considered so as to minimize the impact of the transmission lines.

2. Alignment will be selected so as to minimize conflict between present or proposed land use and the proposed transmission line. Preferably, easements will be purchased rather than acquiring the land outright, thus permitting its utilization for other purposes.

3. Ecologically sensitive communities (such as riparian

woodland, needle-leaf and high fir forest, etc.) will be avoided, where possible.

4. Existing rights-of-way (transmission lines, pipelines, existing roads, etc.) will be used where possible to minimize impact on the environment.

5. All areas listed in the National Register of Historic Places and the National Register of Natural Landmarks, maintained by the Secretary of the Interior, will be avoided sufficiently to minimize visual impact.

6. All officially designated parks and other scenic wildlife and recreational lands which have been set up by public authorities will be avoided sufficiently to minimize visual impact.

7. Rights-of-way will avoid prime or scenic timbered areas.

8. An archeologist will examine the proposed rights-of-way in the field and on aerial photographs to outline sensitive areas and identify vulnerable spots. These will be avoided to the fullest extent possible.

9. When the right-of-way parallels a road, the transmission line will be located in such a manner as to make it as unobtrusive as possible. However, unobtrusiveness will not be achieved at the expense

of invading a virgin, undeveloped area. Longitudinal alignment along ridge tops and other such topographic features which would emphasize the presence of the transmission line will be avoided.

10. Where applicable, F. F. A. guidelines, regulations and requirements will be complied with in every respect.

B. Clearing

1. Clearing will be the minimum amount possible which will permit access to the structures by structure construction and conductor stringing vehicles.

2. Electrical clearances, in keeping with the National Electric Safety Code and line reliability, will be provided. In the very few areas, if any, where trees are encountered, clearing or topping of trees will be limited to the amount required to provide these clearances.

3. In the very few areas, if any, where trees are encountered and clearing or topping is necessary, only the area under the wires and not the entire width of the right-of-way will be affected. Danger trees (trees that could fall on the line) will be topped.

4. In the very few areas, if any, where trees are encountered, topping and pruning of trees will be done rather than clearing where possible.

5. Vegetation will be retained along the right-of-way where possible.

6. In all areas, if reseeding is deemed necessary by the land management agency, this will be done in accordance with their recommendations.

7. Measures will be taken near streams and rivers (the Rio Grande and the Gila) to prevent deposition of silt.

8. Brush blades will be used to clear vegetation unless otherwise directed by the land management agency. This will provide future mulch and fertilizer for the grass and low growing brush. In the very few areas where trees may be encountered which must be cleared, they will be disposed of or placed according to the directives of the land management agency.

9. Stipulations of the land management agency to grind up, remove, conceal, stack or scatter cleared waste will be followed. Burning of cleared waste, unless required by the land management agency, will not be allowed.

10. Precautions, including pre-construction fire prevention programs, will be taken to prevent accidentally starting range fires. All laws and regulations will be strictly complied with.

11. Herbicides and soil sterilants will not be used on national resource lands.

12. Buffer areas will be preserved between the power line corridor and any ecologically sensitive area.

13. Use of land for other purposes which are consistent with the electrical maintenance requirements will be permitted.

C. Access Road and Line Construction

1. Throughout the construction phase, close field surveillance will be provided.

2. Construction areas (storage sites, camp sites, etc.) will be built and maintained so as to minimize erosion and disruption to the landscape. The contractor will be required to provide fencing around storage yards and to keep yards clean and orderly at all times. Yards will be maintained free of weed accumulations and combustible debris so as to minimize fire hazard. Carbon dioxide fire extinguishers shall be available at each yard at all times. When the use of the yard is no longer

required, the site shall be cleaned and left clear of ruts, fence posts and debris of any kind.

3. Soil erosion will be prevented by use of kicker dikes, etc. meeting the requirements of the land management agency.

4. Disturbances of the soil will be held to a minimum and restoration measures used in accordance with recommendations of the land management agency.

5. Malicious types of pollution (oil spills, sanitary waste, etc.) will not be permitted.

6. Sock lines will be strung in and then the conductor will be pulled under tension to reduce the amount of clearing necessary and to protect the conductor.

7. Existing roads and trails will be used when possible for construction.

8. Specifications of the land management agency pertaining to access roads will be implemented.

9. A main haul road will be constructed (minimum possible to permit access) with additional spur roads when required (sheer cliffs, inaccessible locations and other areas where it is impractical to built a continuous road). Entrance into the access road will normally be from existing roads. The land management agency recommendations will be

used to discourage unauthorized usage of access roads, either permanent or temporary.

10. Blasting will be used for opening pole holes in rock but limited to breaking up the rock so that it can be removed by the digger. Care will be taken to avoid damage to animal habitat.

11. After construction, the access road will be harrowed and reseeded or simply let return to its original state, as specified by the land management agency.

12. During construction, dust suppression methods will be employed where necessary to limit air pollution.

D. Operation

1. Both ends of the line will be protected by lightning arresters and circuit breakers to minimize fire and electric shock hazards. In case of conductor breakage, all conductors will be deenergized instantly.

2. All fence wires and metal gates parallel to the line within the limits of the right of way will be grounded. Fences requiring grounding by the preceding criteria will be grounded at least once every 700 feet. Metal gates attached to fences which cross the right-of-way will be grounded. The associated fence wires will also be grounded.

3. Native vegetation which does not pose a hazard to the transmission lines will be allowed to grow on the right-of-way.

4. Aerial and ground maintenance inspection activities of the power line facility will include observations of soil erosion problems, fallen timber and conditions of the vegetation that require attention. Aircraft will be used where possible to inspect and maintain the corridor.

E. Guidelines

1. Guidelines will be written into construction contracts.

2. Meetings will be held prior to construction with contractor personnel to explain guidelines.

3. Adherence to guidelines will be monitored by inspectors.

APPENDIX F

A STUDY OF THE INFLUENCE OF POWER TRANSMISSION LINES UPON BIRDS OF PREY HABITAT

Preface

The purpose of this report is to illustrate the utilization of transmission line structures by birds of prey in desert grassland, desert shrub communities and agricultural lands in southwestern New Mexico. The vegetative communities involved are grassland, grassland-yucca, grassland-mesquite, mesquite-sand dune, creosote and agricultural lands (farmland). Interpretations from the data have limitations if one attempts to apply them to the entire area traversed by the proposed Greenlee-El Paso 345 KV transmission lines. However, the communities traversed by the proposed lines represent comparable habitat and form the basis for predictions of which bird of prey species will most commonly utilize the transmission lines in various habitats.

Introduction

The Public Service Company of New Mexico (PNM) raptor (birds of prey) study entails observing certain hawk, eagle and falcon species in various habitats as they utilize electrical transmission lines in north west, north central, south central and southwest New Mexico. It is done in conjunction with helicopeter line patrol of such utilities. Birds of prey use various portions of transmission line pole structures such as pole tops, cross arms, side arms, x-braces and static wires (lightning shields). Transmission lines of three voltage levels are involved: 115 KV, 230 KV, and 345 KV. The data presented herein was collected in 1973 and 1974 from the 58 mile (93.3 kilometers) long Las Cruces-Deming 115 KV transmission line.

Birds of prey are attracted to these man-made facilities because they afford tall vantage points for observing potential prey, roosting, perching and nesting. The heights of the portions of structures utilized by the birds vary from 35 feet (x-braces) to nearly 80 feet (tops of poles) (10.7-24.4 meters). Crossarms vary from 65 to 75 feet (19.8-22.9 meters) above ground. The variation in height is dependent on the voltage level of the transmission line. Higher voltage lines have higher poles, crossarms and x-braces.

A distinction should be made between transmission and distribution lines. There are marked physical and dimensional differences between the two types of electrical facilities. The transmission lines in the PNM raptor study are much larger than distribution lines. The latter are usually on single poles, whereas transmission facilities in the study area are H and K frame two-poled structures (except where angles in the line and topography dictate more than two poles). A key difference is the distance between conductors. Conductors on PNM 115 KV H frame wood pole transmission lines are 14.5 feet (4.4 meters) apart. Conductors on 230 KV and 345 KV lines are 20 feet (6.1 meters) and 26 feet (7.9 meters) apart, respectively. Multiwired distribution lines usually have less than 6 feet separating each conductor and pose the threat of electrocution to raptors. This is not the case for transmission lines.

Nine species have been observed on transmission structures in New Mexico: Cooper's hawk (<u>Accipiter cooperii</u>), red-tailed hawk

(*Buteo jamaicensis*), rough-legged hawk (*B. lagopus*, ferruginous hawk (*B. regalis*), Swainson's hawk (*B. swainsoni*), golden eagle (*Aquila chrysaetos*), peregrine falcon (*Falco peregrinus*), prairie falcon (*F. mexicanux*) and American kestrel (*F. sparverius*). Cooper's hawks and peregrine falcons have been observed rarely. However, the other seven species are observed in varying degrees of abundance at different times of the year. Marsh hawks (*Circus cyaneus*) have been observed frequently but not on structures. It is believed the other hawk, eagle, and falcon species occurring in New Mexico have not been observed due to geographical, altitudinal, habitat and behavioral characteristics. New Mexico raptor species that vary in abundance, common to rare, that have not been observed on or near transmission lines include Harris hawk (*Parabuteo unicinctus*), gray hawk (*Buteo nitidus*), zone-tailed hawk (*B. albonotatus*), black hawk (*Buteogallus anthracinus*), bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), caracara (*Caracara cheriway*), aplomado falcon (*Falco femoralis*) and merlin (*F. columbarius*).

Methods

Data collection is conducted during aerial inspection of transmission facilities. The Las Cruces-Deming 115 KV line is flown every other month.

During facility inspection the helicopter is flown approximately 10 feet (3.0 meters) above and 35 feet (10.7 meters) to the side of the transmission line. Air speed averages 50 knots. All aspects (crossarms, etc.) are in full view of the observer.

Pole structures are numbered consecutively. Thus an obseved raptor can be noted by specific location.

Plant communities traversed by the patrolled lines are identified. Ruling spans for each line were used to extrapolate mileage of each community crossed. For example, if a transmission line with an 800 feet (243.8 meters) ruling span (6.6 structures/mile) traverses a creosote-bush community for 80 structures, approximately 12.1 miles (19.5 kilometers) of that plant community is crossed. This information is compiled for each line studied. Temperature and other general climatic factors such as cloud cover and wind are monitored for each flight at takeoff and during flight.

Results and Discussion*

The most frequently observed raptor on the Las Cruces-Deming line during the 1973-1974 period was the golden eagle (table 1). It was followed by the red-tailed hawk, American kestrel, prairie falcon, Swainson's hawk, ferruginous hawk, marsh hawk, unidentified buteos and rough-legged hawk respectively. Noticeable declines in numbers of red-tailed hawks, marsh hawks, and American kestrels occurred from 1973 to 1974. Golden eagles, on the other hand, showed a marked increase from 1973 to 1974. Prairie falcons were also more abundant in 1974.

Grassland-mesquite had the greatest abundance (0.66 birds/mile) of raptors in 1973-74 (table 2). Grassland-yucca followed closely (0.60) while farmland (0.46), mesquite-sand dune (0.41), creosote

*Tables and discussion in this section use English measuring system, not metric.

(0.34) and grassland (0.23) exhibited fewer birds. Farmland had the greatest densities of the American kestrel. Red-tailed hawks had similar densities in grassland-mesquite and mesquite-sand dune communities (0.15 and 0.14 red-tails/mile of each habitat respectively). Swainson's hawk, a common raptor in the region during spring, summer and fall, was most often observed in grassland-mesquite although this species breeds primarily in grassland-yucca habitat. The golden eagle's greatest abundance occurred in grassland-mesquite (0.19 eagles/mile of habitat flown), whereas creosote and grassland-yucca had similar values, 0.12 and 0.11 golden eagles/mile. Prairie falcons were most abundant in grassland-yucca (0.14 prairie falcons/mile). For the other habitats observed, the abundance of this falcon varied little but was much lower, around 0.05.

Tables 3 and 4 show that the overall number of raptors observed in 1974 (0.44 birds/mile of line flown) was slightly higher than 1973 (0.40).

Noticeable differences between 1973 and 1974 can be seen in the overall relative abundance of raptors in grassland, mesquite-sand dune, creosote and farmland habitats (tables 3 and 4). Grassland-mesquite and grassland-yucca habitats exhibited similar abundance values for both years. The decrease in 1974 of raptor abundance in grassland was due to lack of observed buteos (ferruginous and Swainson's), golden eagles and American kestrels. An increase in 1974 in raptor abundance in creosote was attributed primarily to the greater number of observed golden eagles in that habitat. Less

observed American kestrels in farmland accounted for less overall abundance for that habitat type in 1974 than 1973.

Nesting on the transmission structures was not observed during the 1973 to 1974 flights. Old unoccupied raven (unidentified) nests occur on the crossarms of several pole structures. Existing 345 KV pole structures in the same habitat type on the Jornada del Muerto (Sierra and Dona Ana Counties, in part) supported raven, Swainson's hawk and red-tailed hawk nests in 1973-74.

Summary and Conclusions

Golden eagles, red-tailed hawks and American kestrels were the most frequently observed raptors. Prairie falcons and Swainson's hawks were observed but to a lesser degree than the above three. Remaining raptor species observed were considerably less frequent.

Grassland-mesquite and grassland-yucca habitats supported the greatest number of raptors on transmission lines.

The utilitization of the proposed 345 KV transmission lines by raptors can be anticipated as being very similar to that observed in this study. Variations, though, are to be expected. The general pattern seen in the Las Cruces-Deming data should apply to the same communities traversed by the proposed Greenlee-El Paso 345 KV transmission lines.

Table 1

Yearly Numbers of Each Raptor Species Observed
Utilizing the Las Cruces - Deming 115 KV Transmission Line

	1973[1]	1974[2]	1973-1974
Buteo jamaicensis red-tailed hawk	29 (25.2)[3]	21 (20.6)	50 (23.0)
Buteo lagopus rough-legged hawk	2 (1.7)	1 (0.9)	3 (1.4)
Buteo regalis ferruginous hawk	4 (3.5)	3 (2.9)	7 (3.2)
Buteo swainsoni Swainson's hawk	13 (11.3)	11 (10.9)	24 (11.1)
Buteo (unidentified)	3 (2.6)	1 (0.9)	4 (1.8)
Circus cyaneus marsh hawk	5 (4.4)	-	5 (2.3)
Aquila chrysaetos golden eagle	18 (15.6)	34 (33.3)	52 (24.0)
Falco mexicanus prairie falcon	12 (10.4)	14 (13.7)	26 (12.0)
Falco sparverius American kestrel	29 (25.2)	17 (16.8)	46 (21.2)
Total	115	102	217

[1] 289 miles of line flown

[2] 231 miles of line flown

[3] Figures in parentheses are percentages the corresponding number represents for the year or two year period

Relative Abundance of Raptors Utilizing the Las Cruces - Deming 115 KV Transmission Line in Various Habitats - 1973 and 1974 Data Combined

	Farmland (32.4)[1]	Creosote (134.1)	Grassland Mesquite (46.8)	Mesquite Sand Dune (225.9)	Grassland Yucca (36.9)	Grassland (44.1)	Total (520.2)
Buteo jamaicensis	1[2] (0.03)[3]	9 (0.07)	7 (0.15)	32 (0.14)	1 (0.03)		50 (0.10)
Buteo lagopus				2 (0.008)	1 (0.03)		3 (0.005)
Buteo regalis		1 (0.007)		3 (0.01)	2 (0.05)	1 (0.02)	7 (0.01)
Buteo swainsoni			9 (0.19)	10 (0.04)	3 (0.08)	2 (0.05)	24 (0.05)
Buteo (unidentified)				4 (0.02)			4 (0.007)
Circus cyaneus	1 (0.03)	1 (0.007)	1 (0.02)	1 (0.004)			4 (0.007)
Aquila chrysaetos		16 (0.12)	9 (0.19)	21 (0.09)	4 (0.11)	2 (0.05)	52 (0.10)
Falco mexicanus		6 (0.04)	2 (0.04)	11 (0.05)	5 (0.14)	2 (0.05)	26 (0.05)
Falco sparverius	13 (0.40)	12 (0.09)	3 (0.06)	9 (0.04)	6 (0.16)	3 (0.07)	46 (0.09)
Total	15 (0.46)	45 (0.34)	31 (0.66)	93 (0.41)	22 (0.60)	10 (0.23)	216 (0.41)

1 mileage of habitat traversed in 1973 and 1974

2 number observed in habitat

3 number of each species observed/mile of habitat traversed

F-8

Table 3

Relative Abundance of Raptors Utilizing
the Las Cruces - Deming 115 KV Transmission Line
in Various Habitats During 1973

	Farmland (18.0)[1]	Creosote (74.5)	Grassland Mesquite (26.0)	Mesquite Sand Dune (125.5)	Grassland Yucca (20.5)	Grassland (24.5)	Total (289.0)
Buteo jamaicensis		4[2] (0.05)[3]	6 (0.23)	18 (0.14)	1 (0.05)		29 (0.10)
Buteo lagopus				1 (0.01)	1 (0.05)		2 (0.006)
Buteo regalis				1 (0.01)	2 (0.10)	1 (0.04)	4 (0.01)
Buteo swainsoni			7 (0.27)	3 (0.02)	1 (0.05)	2 (0.08)	13 (0.04)
Buteo (unidentified)				3 (0.02)			3 (0.01)
Circus cyaneus	1 (0.06)	1 (0.01)	1 (0.04)	1 (0.01)		1 (0.04)	5 (0.02)
Aquila chrysaetos		4 (0.05)	1 (0.04)	9 (0.07)	2 (0.10)	2 (0.08)	18 (0.06)
Falco mexicanus		2 (0.03)	2 (0.08)	5 (0.04)	2 (0.10)	1 (0.04)	12 (0.04)
Falco sparverius	12 (0.67)	5 (0.07)	1 (0.04)	5 (0.04)	3 (0.15)	3 (0.12)	29 (0.10)
Total	13 (0.72)	16 (0.21)	18 (0.69)	46 (0.37)	12 (0.59)	10 (0.41)	115 (0.40)

1 mileage of habitat traversed in 1973

2 number observed in habitat

3 number of each species observed/miles of habitat traversed

Table 4

Relative Abundance of Raptors Utilizing the Las Cruces - Deming 115 KV Transmission Line in Various Habitats in 1974

	Farmland (14.4)[1]	Creosote (59.6)	Grassland Mesquite (20.8)	Mesquite Sand Dune (100.4)	Grassland Yucca (16.4)	Grassland (19.6)	Total (231.2)
Buteo jamaicensis	1[2] (0.07)[3]	5 (0.08)	1 (0.05)	14 (0.14)			21 (0.09)
Buteo lagopus				1 (0.01)			1 (0.004)
Buteo regalis		1 (0.02)		2 (0.02)			3 (0.01)
Buteo swainsoni			2 (0.10)	7 (0.07)	2 (0.12)		11 (0.05)
Buteo (unidentified)				1 (0.01)			1 (0.004)
Circus cyaneus							
Aquila chrysaetos		12 (0.20)	8 (0.38)	12 (0.12)	2 (0.12)		34 (0.15)
Falco mexicanus		4 (0.07)		6 (0.06)	3 (0.18)	1 (0.05)	14 (0.06)
Falco sparverius	1 (0.07)	7 (0.12)	2 (0.10)	4 (0.04)	3 (0.18)		17 (0.07)
Total	2 (0.14)	29 (0.49)	13 (0.63)	47 (0.47)	10 (0.61)	1 (0.05)	102 (0.44)

[1] mileage of habitat traversed in 1974

[2] number observed in habitat

[3] number of each species observed/mile of habitat traversed

APPENDIX G

A BRIEF OVERVIEW OF THE PREHISTORY OF SOUTHWESTERN NEW MEXICO

A Brief Overview of the Prehistory of Southwestern New Mexico

Archaeologically speaking, southern New Mexico has been one of the least understood parts of the state, possibly because there are few spectacular ruins or monuments. More work has been done in the western part of the state than in the eastern, but archaeologists still have more questions than answers about the area. Most of the archaeological work in this part of the state has been done so long ago that the information has only limited value for modern archaeologists.

The archaeological summary below is organized on the basis of the stage system which is generally accepted by American Archaeologists (see Willey and Phillips 1958).

Lithic Stage

The Lithic Stage dates from late glacial and early post-glacial times. The available evidence, which is relatively sparse, indicates that cultures at this stage placed heavy emphasis on hunting. Many of the animals associated with this stage are now extinct.

The earliest humans in southwestern New Mexico seem to have been the hunters of the Llano Complex, which includes, among others, the Clovis and Folsom traditions. We have little integrated information on the Llano occupation of this area. For the most part, our knowledge comes from scattered finds of Clovis, Folsom, Plainview and Scottsbluff points. In the absence of any information, we can only suppose that

the general sequence in this area follows that of the rest of the state (see Wormington 1957; Judge 1973).

At the start of the Altithermal, a period of general drying which began about 7000 B.C., the hunters of the Llano complex seem to have moved out into the Great Plains, probably following the herd animals (e.g., bison) which were their accustomed prey.

Archaic Stage

The Archaic Stage is a phenomenon of the post glacial period. Archaic peoples are generally characterized by the hunting of modern species of animals and by a heavy reliance on wild plant foods. Grinding stones and a number of stone tools which seem to have been used for processing vegetable foods became common. The Archaic tradition found in southwestern New Mexico is called the Cochise. The Cochise tradition has been divided into three (or possibly four) sequential stages. Most of the Cochise sites which have been excavated and interpreted lie around the margins of southwestern New Mexico. In this area we need the full range of archaeological work, beginning with the very basic task of testing and validating the chronological sequence and then proceeding to more sophisticated studies.

The three stages of the Cochise Culture are termed Sulphur Springs, Chiricahua, and San Pedro. There has been some attempt, as we shall see later, to establish another phase, the Cazador, placed between that of the Sulphur Springs and Chiricahua phases.

The Sulphur Springs stage of Sayles and Antevs (1941:8-9) is the least understood and oldest of the trio. There are only a handful of

known sites that can be definitely atrributed to the Surphur Springs stage. If geological dating by Antevs is correct, then the Surphur Springs type site places the earliest Cochise Culture beside the Llano hunting cultures toward the end of the last glacial epoch.

This placement is supported by the fauna that Sayles stated were found in direct association stratigraphically with the Sulphur Springs artifacts: horse, bison, pronghorn antelope, dire wolf, coyote, mammoth (Sayles 1941:12). To this list of fauna, Whalen (1971:94) adds: snow goose, mallard duck, teal-duck, raven, mussel, clams, and jackrabbit.

There has, in the past, been recognized a temporal hiatus between the Sulphur Springs stage and the Chiricahua stage - mostly due to the relatively few radiocarbon dated sites of the two stages.

This temporal gap has sometimes been referred to as the Cazador stage (Antevs 1962:192-195; Sayles 1964:476). A recent study of the San Pedro Valley (Whalen 1971:69-70) reviews an unpublished manuscript of Sayles (dated 1958) on the tool assemblage of the Cazador type site:

> At the Double Adobe type site, Sayles included in the Cazador tool complex biface blades, leaf-shaped flakes, heavily barbed corner notched projectile points, and leaf-shaped projectile points, bone implements, and some milling stones. With reference to Cazador tools, he remarked: "Other types of chipped stone tools are present in the Cazador stage and are comparable to those identified with the Sulphur Springs Stage." (Whalen 1971:69).

Cazador type sites have been questioned as to their separate stage status as the known sites all lie within a short distance from known Sulphur Springs type sites. These Cazador sites have been lumped together with the Sulphur Springs sites and assigned to the Sulphur

Springs stage by Whalen for briefly the following reasons:

> ...(1) the two radio-carbon dates available for this stage, collected from a pollen profile by Martin (1963: 38, 57) at the Cazador type sites at Double Adobe register 6, 280 B.C. (charcoal) and 5, 070 B.C. (leached carbonaceous alluvium). Both dates fall within the time range prescribed for the Sulphur Springs; (2) the presence of scraping and cutting tools at Sulphur Springs sites combined with the presence of burned and cracked animal bones, suggest participation in hunting...(3)...the four Cazador sites found in the 1950's were all along Whitewater Draw at locations formerly classified Sulphur Springs sites. No Cazador site has been found adjacent to a Chiricahua site (Whalen 1971:69-70).

The spatial and temporal relationship and close proximity of the Cazador sites to the Sulphur Springs stage sites would tend to discredit the validity of maintaining two distinct stages for what are probably two distinct usage areas for one nuclear group of hunters and gatherers. Irwin-Williams also questions the age of the Cazador materials and states that "...the detailed similarity of Cazador artifacts to those of the late Chiricahua Phase makes this [Cazador Stage] at the moment unacceptable." (Irwin-Williams 1968:51). For the moment the question of the Cazador Stage is still open.

The Chiricahua stage, as identified by Sayles (1941:15) is found under two conditions:

1. In association with middens and hearths along the foothills of the eastern slope of the Chiricahua Mountains;

2. In erosion channels later than the deposits containing artifacts identified with the Sulphur Springs stage.

The Chiricahua stage has been identified and tied to a large spatial area in eastern Arizona, New Mexico, and northern Mexico (Irwin-Williams 1967:447). These sites contain identifiable point types. Dick (1965:30-33) gives these as the leaf-shaped Pelona; the concave base, side-notched Chiricahua; the contracting stem, Augustin; along with the possible earlier Bat Cave form which

> ...is a leaf-shaped point with slight lateral indentations below the base. The point has been named Bat Cave Point, to facilitate future reference. This point is concentrated in the buff sand horizon and the above two levels in the midden. It correlates stratigraphically with the Augustin Point.(Dick 1965:32).

The majority of flaked lithic tools, excluding projectile points, tend to be core tools. Choppers and plane scrapers are percussion flaked; hammerstones are often unmodified cobbles whose sides show signs of battering. Pressure flaked tools are present in the form of side scrapers and cutting edges. These are largely made from percussion flakes.

Manos and metates appear in large numbers in both space and time throughout the Cochise development. The mano tends to be the one-handed asymmetrical mano, generally from locally indigenous stone. Metates generally are slab metates or a shallow basin type. These are principally used for the processing of wild foodstuffs.

Fauna include: coyote, bison, turtle, pronghorn antelope, mule deer, jackrabbit, cottontail, Sonora deer, woodrat, porcupine, wolf, rock squirrel, wildcat, kit fox, prairie dog, badger, bighorn sheep, gray fox (Whalen 1971:94-95). Corn and squash appear for the first

time in the archaeological record at Bat Cave, the corn being related to Chapalote, a type of popcorn. Later, in San Pedro times, there is evidence of introgression of teosinte which allows for a larger possible ear and better adaptation to lower altitude and drought. Other flora include: amaranth seeds, blue gramma seeds, juniper berries, sunflower seeds, walnuts, and yucca pods (Whalen 1971:99-100).

The type site for the succeeding San Pedro stage assigned by Sayles and Antevs (1941:21) is in an exposure of an arroyo wall of the San Pedro drainage. The deposition of the site was later in time than that of the Chiricahua stage soils.

Grinding tools continue in wide usage in this stage, along with the addition of the mortar and pestle. The manos are generally larger than the types from the earlier stages and the metates usually have a deeper basin (Sayles and Antevs 1941:24).

A wider use of flora appears to take place, suggesting the reasons for adding the mortar and pestle to the artifact inventory. Beans were added (Dick 1965:106) to complete the Southwest domesticated trio of corn, beans, and squash. Other economical plants include: acorns, agave, amaranth seeds, blue grama seeds, bluegrass seeds, bulrush rhyzomes, cattail seeds, goosefoot seeds, festuca seeds, juniper berries, pine nuts, prickly pear buds, primrose seeds, red berry, sagebrush seeds, saltbush seeds, sunflower seeds, trisetum seeds, walnuts and yucca pods (Whalen 1971:99-100). This is almost a 300 percent increase from 8 plants utilized to 23 in the recorded archaeological records from Chiricahua to San Pedro times.

The point typology of the San Pedro becomes more complex as regional differences begin to appear. Generally, however, the points belong to variations of shallow corner-notched and shallow side-notched types. More use of pressure flaking is evident in the San Pedro projectile points than in previous stages.

The local fauna continue to be exploited in San Pedro times with the exception of the turtle. The list includes all of those utilized by the Chiricahua and expands to include gopher, ringtail cat, elk, duck, hawk, muskrat, and turkey (Whalen 1971:94-95).

Sometime near the beginning of the Christian era (the date is not firmly established), the Cochise gatherers gradually shifted to a horticultural economy and entered the Formative Stage.

Formative Stage

The Formative Stage is characterized by a heavy dependence on domesticated plants (and sometimes animals), the presence of permanent villages and the manufacture of pottery. In southwestern New Mexico, the Formative population, the Mogollon, seem to have developed directly out of the Cochise. This shift to a Formative economy did not happen at the same time in all parts of southwestern New Mexico. Along the Rio Grande, an archaic way of life may have continued until as late as A.D. 900.

The earliest Mogollon artifact assemblage seems to be a San Pedro Cochise assemblage with the addition of pottery and pit houses (houses with the floors dug below the surface of the ground, with the walls of the pit serving as part of the house walls). The techniques for

making pottery probably spread into the Southwest from Mexico. The pit house may have developed locally.

Joe Ben Wheat (1955) has divided the Mogollon into six geographical branches. All are generally similar, but each has certain specialized features and each has a slightly different cultural sequence.

The Mogollon of the Mimbres Branch (basically the Gila and Mimbres drainages) began with the following basic characteristics: pit houses with sloping entrance passages; red-slipped pottery; plain brown pottery and a general absence of obvious luxury goods. For about the first thousand years of their occupation of the area, the basic inventory changed very little, though styles did change. After about A.D. 850, the Mimbres Branch inventory began to change with the addition of many features imported from outside the area. It has been assumed that most of the new features came from the north, but it is now suspected that some, at least, were a result of influence from civilized Mexico.

Most of the good evidence from early Mogollon sites comes from the Reserve area. In the absence of evidence to the contrary, archaeologists have assumed that the early development of the Mogollon was the same throughout the Mimbres Branch, but this may not be true. About A.D. 1000 (Reserve Phase), the Mogollon in the northern part of the area shifted from a Mogollon pattern with some northern (Anasazi) influence to an Anasazi pattern with some Mogollon characteristics. They adopted surface houses of stone masonry, ceremonial structures of an Anasazi pattern and black-on-white pottery made with Anasazi techniques. Further south, the same changes occurred during the Mangus and Mimbres Phases,

but more slowly and with a less complete rejection of Mogollon traditions.

Phases of the Mimbres Branch

South	North
Pinelawn	Pinelawn
Georgetown	Georgetown
San Lorenzo (?)	San Lorenzo (?)
San Francisco	San Francisco
Three Circle	Three Circle
Mangus	Reserve
Mimbres	Tularosa

About A.D. 1250 or 1300, the Mogollon abandoned southwestern New Mexico. At least some of them seem to have moved north.

After the Mimbres Branch Mogollon left, they were replaced by one or more groups which are collectively called the "Animas Phase". The Animas Phase is poorly understood. Pottery and houses typical of Casas Grandes (Chihuahua), Salado (eastern Arizona) and Jornada Mogollon (Rio Grande Valley) appear. No site with an Animas Phase occupation has been excavated by a modern professional archaeologist.

Along the Gila River, adobe pueblos of the Salado tradition were built. The relationship between the Salado peoples and the "Animas Phase" is unknown.

Finally, at about the beginning of the historic period, the Athabaskan-speaking Apache moved into the area.

While it is possible to produce a reasonably coherent summary of what is known of the prehistory of southwestern New Mexico, actually we know only a fraction of what we need to know before we can understand the prehistory of the area.

A Brief Historic Overview of Camp Cody

Camp Cody was a training center for the United States Army's 34th Division. It was built and established in 1917 at a cost of $2,025,000 (NMHRS 1942:14).

The first military contingent to arrive at Camp Cody was the Minnesota National Guard, organized as the 135th Infantry Regiment. Additional National Guard troops were brought from North Dakota, South Dakota, Iowa and Nebraska. These National Guard Units became the 34th Infantry Division in October 1917 (James 1971:58). Troops of the 34th Division who trained here nicknamed themselves the "Sandstorm Division" (James 1971:18).

At the termination of World War I, the facilities were used as a tuberculosis sanitarium for ex-soldiers by the United States Public Health Service. In 1922, the Camp Cody facilities were transferred to the Deming Chamber of Commerce (NMHRS 1942:14).

From 1923 until it closed its doors in 1938, the sanitarium was operated by the Sisters of Holy Cross of Notre Dame. Six sisters acted as caretakers of the property until March 12, 1939, when a careless smoker and a cigarette butt started a grass fire that quickly razed the sanitarium and could be seen 55 miles away in Silver City (El Paso Times 3/13/39:1).

GLOSSARY

ALLUVIAL	Water deposited materials.
ALTERNATING CURRENT (ac)	An electric current that reverses its direction of flow periodically as contrasted to direct current.
AMPERE	The unit of electric current produced by one volt applied across a resistance of one ohm.
ANGLE SUSPENSION TOWERS	Transmission towers used at points where the power line deviates from a straight line at an angle.
AQUIFER	Porous soil lying between impermeable strata to which water may move, yielding groundwater for wells and springs.
BIOTA	The fauna (animals) and flora (plants) of a region.
CALICHE	A surface deposit that consists of sand or clay impregnated with crystalline salts, such as sodium nitrate or sodium chloride.
CATHODIC PROTECTION	The principle of supplying an electric current flowing through the soil towards a pipe from an outside source to prevent corrosion of the pipe.
CIRCUIT	A combination of interconnected devices forming a closed path over which electric current is intended to flow.
CIRCUIT BREAKER	A switch that automatically opens an electric circuit carrying power when an abnormal condition occurs.

GLOSSARY (Continued)

COMMON CARRIER	A company recognized by an appropriate regulatory agency as having a vested interest in furnishing communications services or in transporting commodities such as gas, oil or electricity.
CONDUCTOR	A component of an electric line over which current flows.
CORONA	A discharge, which is often luminous, at the surface of a conductor. It is accompanied by ionization of the surrounding atmosphere and power loss.
CORRIDOR	A stretch of land generally a few miles wide within which one or more utilities may be planned.
DEAD-END TOWERS	A transmission tower generally employed for a deviation of a power line at a large angle from a straight line.
DESERT PAVEMENT	Soil surface that is composed of large grained sand and pebbles not readily transported by wind.
DIRECT CURRENT (dc)	Electricity that flows continuously in one direction as contrasted with alternating current.
DISTRIBUTION LINES	Electric power lines operated at less than 69 kilovolts (kV).
ECOLOGY	The study of the interrelationships of organisms to one another and to the environment.
ECOSYSTEM	Ecological system formed by the interaction of coacting organisms (life forms or biota) and their environment (physical factors or abiotic factors).

ELECTROMAGNETIC INTERFERENCE	Any electrical or magnetic disturbance which will change or modulate a received signal, usually applied to disruption of radio or TV signals.
ENDANGERED SPECIES	Those species in danger of extinction throughout all or a significant portion of their range and legally protected by the Endangered Species Act of 1973.
ENDEMIC	Something found or restricted to a particular region or locality.
EPICENTER	The part of the earth's surface directly above the focus of an earthquake.
EROSION	The process of being worn away by the action of water, wind or glacial ice.
FAULT (electric)	An abnormal condition which occurs on electric power lines and disrupts normal operation.
FAUNA	The animals or animal life of a region, period or special environment.
FLASHOVER	An electric arc between two conductors produced by a voltage exceeding the rating of an insulator string across which the arc occurs.
FLOOD PLAIN	A strip of relatively smooth land bordering a stream or river which is built of sedimentary deposits and which is covered with water where the stream or river overflows its banks at flood stages.
FLORA	The plant life characteristic of a region, period or special environment.

FORCED OUTAGE	The shutting down of a generating unit for emergency reasons.
GOTHERMAL AREAS	Any region characterized by the known or suspected presence of deep underground sources of hot water which may potentially be used as a source of heat and/or energy.
GRABEN	An elongated down-faulted crustal unit or block that is bound by faults on its long dimensions. In the basin and range, grabens are commonly valleys.
GROUND GRADIENT	The voltage per unit length that can be measured in the last unit of length before the level of zero potential.
GUYED TOWER	Tower supported by a tension member (a solid wire or stranded wire) to withstand an otherwise unbalanced force on the tower.
HABITAT	The total environment occupied by an organism or population of organisms.
HYDROLOGY	A science dealing with the properties, distribution and circulation of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere.
INSULATOR STRING	A string of procelain units in series which support the conductors on transmission towers and insulates them from electrical ground. These units may be in a vertical, horizontal or a vee string configuration or arrangement.

INTERTIE	A transmission line joining two or more power systems through which power produced by one can be used by the other.
LATTICE TOWER	A tower fabricated from many structural members (usually angle sections) by lacing between members. Also called laced tower since members are "laced" together.
LINE OUTAGE	The de-energization of a transmission line whereby both voltage and current are reduced to zero, and power ceases to be transmitted.
LOAD	The amount of power needed to be delivered at a given point on an electric system.
LOAD CENTER	The point at which the loads of a given area are assumed to be concentrated for purposes of analysis.
MERCALLI SCALE	A relative scale to measure the intensity of an earthquake.
MULTIPLE CIRCUIT TOWER	A tower capable of supporting more than one circuit. Usually refers to more than two circuits.
MULTIPLE USE	Utilization of a utility right-of-way for various non-utility purposes, such as farming or recreation, as well as for utility lines.
MW	Megawatt 1,000,000 watts.
MV	Megavolt 1,000,000 volts.

NOISE	Unwanted sound, either audible or in the form of electromagnetic interference with communications signals.
NON-SPECULAR	Having a flat or non-light reflecting surface. Used primarily in reference to transmission lines, towers and conductors.
OUTAGE	The period in which a generating unit, transmission line, or other facility, is out of service.
PERMANENT OUTAGE	A result of a fault accompanied by some damage to insulation or structure of a line component so extensive that transmission cannot continue.
PERMEABILITY	The property or condition of the soil that relates to the passage of water through it.
PHASE CONFIGURATION	The configuration of the separate conductors carrying the distinct phases (voltages) of a 3-phase alternating current line.
PHASE SPACING	The spacing between the conductors carrying the distinct phases (voltages) of a 3-phase alternating current line.
PHYSIOGRAPHIC PROVINCE	Land classification in terms of common terrain, geology, climate, soils, vegetation, land use, etc.
PIPELINE	A line of pipe with pumps, valves and control devices for conveying liquids, gases or finely divided solids (slurries).

RAPTOR	A bird of prey such as an eagle.
RICHTER SCALE	A scale to measure the energy released during an earthquake, as determined by the amplitude of surface waves. It indicates the magnitude of an earthquake at its epicenter. A Richter magnitude 9 earthquake would be approximately equal to a Mercalli intensity XII earthquake, and would cause total damage.
RIGHT-OF-WAY (ROW)	The actual land within a corridor which is dedicated to line use, either by lease agreement or outright purchase.
RIPARIAN	Land bordering a stream, lake or tidewater.
SCORIA	Light colored cinders.
SEISMIC	Caused by an earthquake or other earth vibration.
SHARED USE	Use of a common corridor by two different utility rights-of-way serving distinct purposes such as highway, transmission line, pipeline, etc.
SHIELD WIRES	Conductors erected along the top of towers and poles to protect insulators and conductors from lightning damage.
SHRINK-SWELL POTENTIAL	The change in volume of a soil mass to be expected with a change of water content.

SINGLE CIRCUIT TOWER	A tower capable of supporting only one circuit.
SPAN	Horizontal distance between adjacent supporting points of a conductor.
SUBSIDENCE	A local mass movement that involves the gradual downward settling or sinking of the solid earth's surface with little or no horizontal movement.
SYSTEM VOLGAGE	The highest effective voltage between any two conductors of a circuit.
TANGENT TOWER	A transmission tower used over straight stretches of a power line. At their point of contact with the tower, the conductors are tangent to the insulators suspended from the tower.
TAP	A connection from one transmission line to another or to a substation.
TEMPORARY OUTAGE	A result of a fault on an electric power line that can be rectified by de-energizing the affected component through circuit breaker or other switching action.
THREATENED SPECIES	Those species likely to become endangered within the foreseeable future throughout all or a significant portion of their range. Threatened species are legally protected by the Endangered Species Act of 1973.

TOPOGRAPHY	Characteristics of ground surface such as plains, hills and mountains; degree of relief, steepness of slopes; and other physiographic features.
TRANSMISSION LINE	A line of structures and conductors used for transporting electrical power at 69 kilovolts or more.
TRANSMISSION SYSTEM	An arrangement of transmission lines, substations, and generating stations used for delivering electric power.
VIEWSCAPE	All elements, natural and manmade, that may be seen with the naked eye from a given vantage point.
VOLT	The potential difference and electromotive force between two points in a conductor carrying a constant current of one ampere across a resistance of one ohm.
VOLTAGE	The electric potential or potential difference expressed in volts.
WATER BARS	Structures placed to divert runoff and control erosion.